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JANUARY 1953
VOLUME 57 NUMBER 1

Published Monthly by
AMERICAN MEDICAL ASSOCIATION
535 NORTH DEARBORN STREET • CHICAGO 10, ILLINOIS

Entered as Second Class Matter Jan. 14, 1925, at the Postoffice at Chicago, Under the Act of March 3, 1879. Annual Subscription, $12.00

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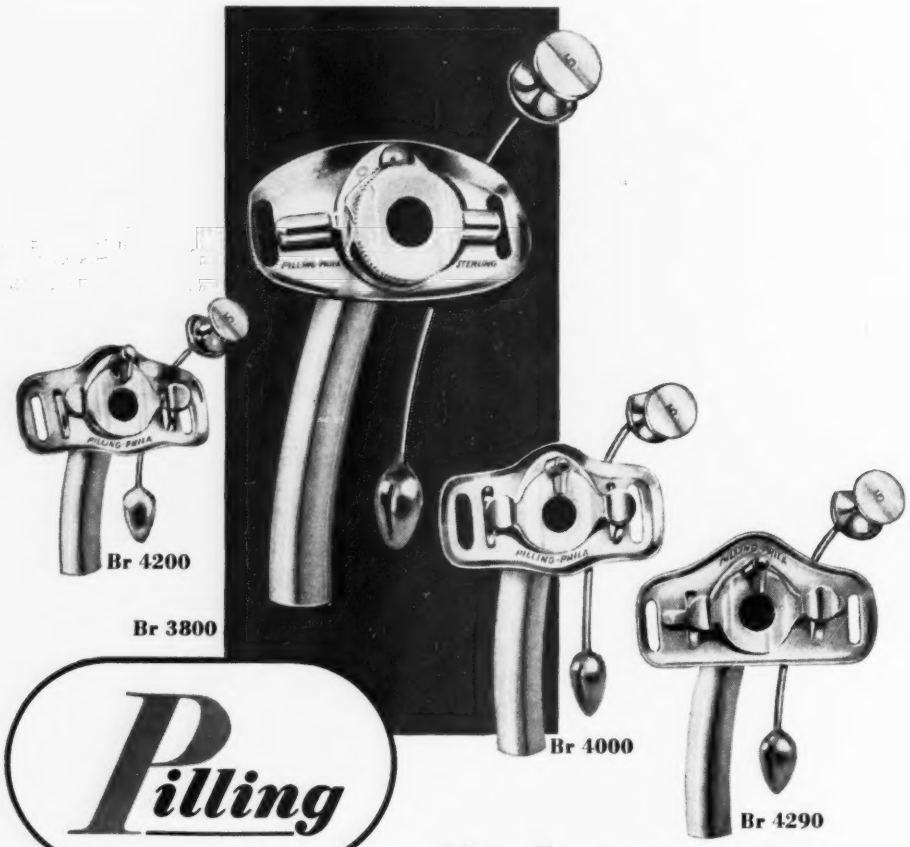

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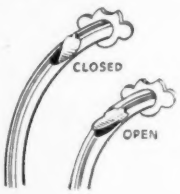

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Communications regarding subscriptions, reprints, etc., should be addressed, A. M. A. ARCHIVES OF OTOLARYNGOLOGY, American Medical Association, 535 North Dearborn Street, Chicago 10.

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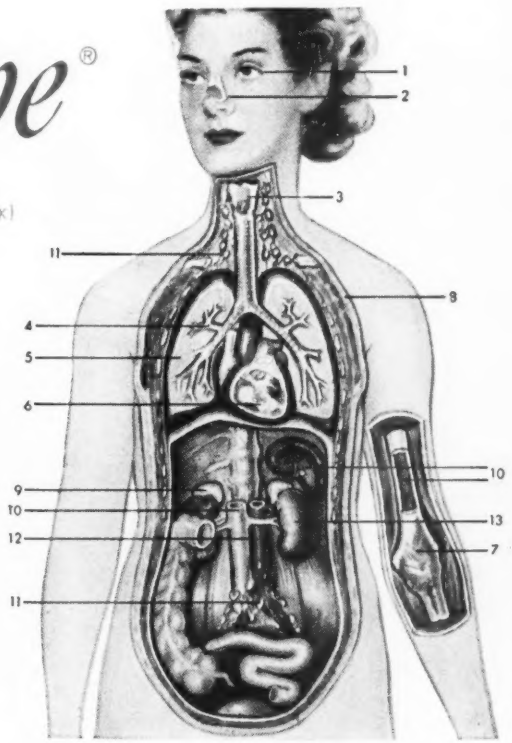

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μηδ' ἐσιδῆν θιγέην τε παρὲξ καὶ θεσμὰ καὶ ὅρκ[ον]

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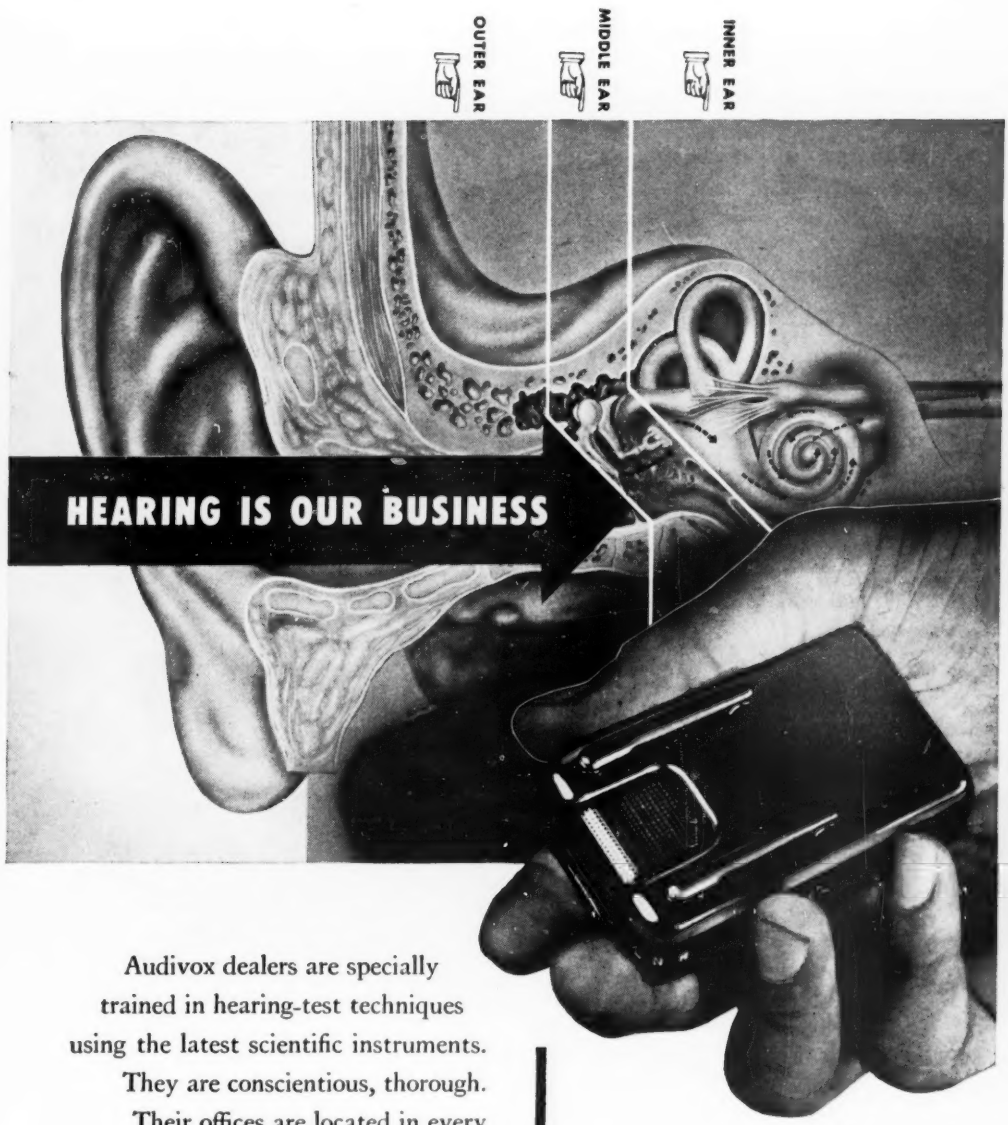

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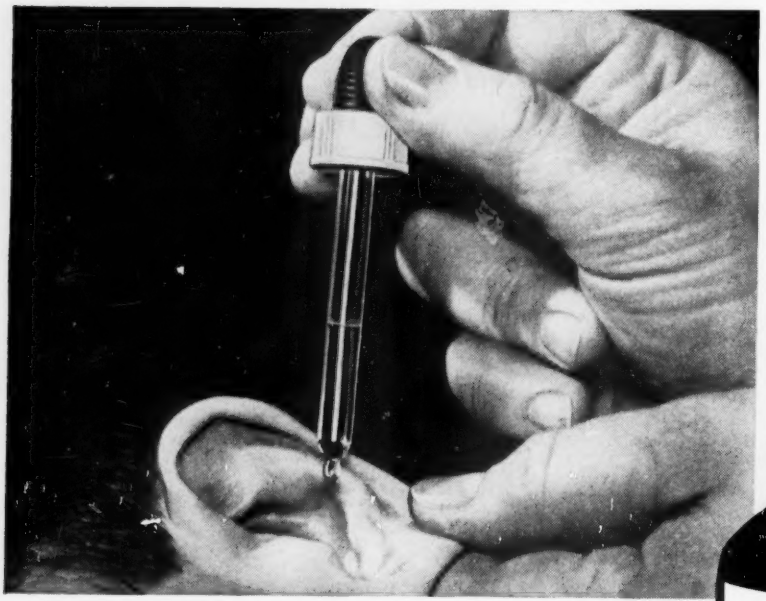

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*Anderson, J. R. and Steele, C. H.: Laryngoscope 58:1279 1948. Douglass, C. C.: Laryngoscope 58:1274 1948. Long, P. H.: A-B-C's of Sulfonamide and Antibiotic Therapy, Philadelphia, W. B. Saunders, 1948, p. 152.

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VOLUME 57 JANUARY 1953 NUMBER 1

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EFFECT OF CORTICAL LESIONS AND ELIMINATION OF RETINAL IMPULSES ON LABYRINTHINE NYSTAGMUS

HENRY T. WYCIS, M.D.
AND
ERNEST A. SPIEGEL, M.D.
PHILADELPHIA

ABLATION of one cerebral hemisphere in rabbits facilitates nystagmus in the direction toward the side of the operation and diminishes nystagmus to the normal hemisphere. This reaction has been observed in postrotational nystagmus (Bauer and Leidler [1]), as well as on calorization of the labyrinth (Dusser de Barenne and de Kleyn [2]). It seemed of interest to ascertain whether circumscribed parts of the cerebral cortex are responsible for this phenomenon, particularly in view of the observation of Fitzgerald and Hallpike [3] that tumors of the temporal lobe may be associated with such a "directional preponderance" of caloric nystagmus to the diseased hemisphere. Spiegel and Scala [4] found a similar prevalence of the nystagmus to the side operated on following section of the optic tract or electrolytic lesion of the external geniculate ganglion. Thus, the further problem arose as to whether afferent retinal impulses may play a role in the mechanism of cortical influences upon the vestibulo-ocular reflex arc.

METHOD

The experiments were performed on 17 cats and 44 dogs. It was, of course, important to obtain as constant preoperative values of labyrinthine excitability as possible. The postrotational nystagmus proved in this respect much more reliable than the caloric nystagmus. The animals were therefore tested on an electrically driven rotating chair producing 10 rotations in 20 seconds. Alternately postrotatory nystagmus to the left and to the right was elicited, with pauses of five minutes. The rotations were repeated at least once, and in case of discrepancies a third series of rotations to the right and to the left was applied. As a rule, animals showing marked differences between the nystagmus to the left and that to the right before operation

From the Department of Experimental Neurology, Temple University School of Medicine.

1. Bauer, J., and Leidler, R.: Über den Einfluss der Ausschaltung verschiedener Hirnabschnitte auf die vestibulären Augenreflexe, Arb. Neurol. Inst. Wien. **29**:155, 1911.

2. Dusser de Barenne, J. G., and de Kleyn, A.: Über vestibuläre Augenreflexe: Vestibularuntersuchungen nach Ausschaltung einer Grosshirnhemisphäre beim Kaninchen, von Graefes Arch. Ophth. **111**:374, 1923.

3. Fitzgerald, G., and Hallpike, C. S.: Studies in Human Vestibular Function: Observation on the Directional Preponderance ("Nystagmusbereitschaft") of Caloric Nystagmus Resulting from Cerebral Lesions, Brain **65**:115, 1942.

4. Spiegel, E. A., and Scala, N. P.: Changes of Labyrinthine Excitability in Lesions of Optic Tract or External Geniculate Body, Arch. Ophth. **34**:408, 1945.

were discarded and were employed for other studies. Only occasionally an animal showing definite differences between the postrotational nystagmus to the left and that to the right was used in order to ascertain whether the cortical operation would be able to reverse the preoperative directional preponderance. One has to bear in mind that repeated examination tends to lower the duration of the postrotational nystagmus, probably owing to habituation. Such a change, however, normally affects the nystagmus to the left as well as that to the right and does not produce a directional preponderance.

RESULTS AND COMMENTS

Directional preponderance of nystagmus to a certain side may be the result of an increase of the nystagmus to this side or of a decrease to the opposite side or of various combinations. In order to facilitate the description, the following types of directional preponderance are distinguished: Type I, increase of nystagmus to the side operated on; Type II, decrease of nystagmus to the normal side; Type III, combination of Types I and II; Type IV, bilateral increase of nystagmus more

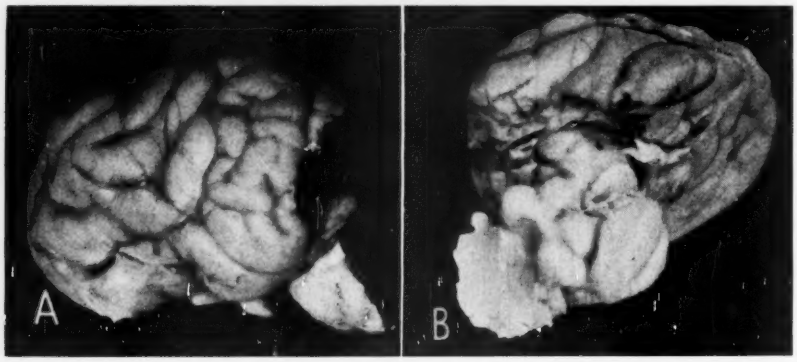

Fig. 1.—Left occipital lobe ablated (Dog. 1008). *A*, lateral view of the left hemisphere. *B*, medial view of the left hemisphere.

pronounced to the side operated on than to the normal side; Type V, bilateral decrease of nystagmus more pronounced to the normal than to the side operated on.

The effect of unilateral occipital lobectomy was studied in three dogs and two cats. In both groups directional preponderance was observed, either Type III (increase of the nystagmus towards the side of the lobectomy, decrease of the nystagmus to the opposite side) or Type IV (bilateral increase of nystagmus, more pronounced to the side of operation). The following protocol (Dog 1008) may serve as an example.

Dog 1008		Postrot. Ny. to R. After 10 Rot.		Postrot. Ny. to L. After 10 Rot.		Ratio Oper./Norm.	
Date	Days Post-Oper.	Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Durat.	No. of Jerks
1/ 2/46	..	6-7	10	6-7	8-10	1.0	0.9
1/ 4/46	..	6	8	7	7-8	1.1	0.9
1/ 4/46	Left occipital lobectomy (Fig. 1)						
1/ 8/46	4	8-9	14-16	18-19	35	2.2	2.3
1/11/46	7	9-10	15	16-17	30-31	1.7	2.0
1/17/46	13	6-7	11	10	16-17	1.5	1.5
1/30/46	26	7-8	11-12	8-9	10-11	1.1	0.9

The changes lasted from a few days to two weeks when the extirpation of the area striata was complete but only a few days when the lesions of this area were incomplete (Dog 750). The change of the number of jerks is often a more sensitive index of directional preponderance than that of the duration of the postrotatory nystagmus. In some instances (e. g., Cat 515; temporoparietal lesion slightly encroaching upon the anterior part of the occipital lobe) the ratio side operated on: normal side was normal regarding the duration, while it was altered only regarding the number of jerks.

The depression of the nystagmus toward the normal side may be associated with an increase of the latent period as observed after lesion of the optic tract (Spiegel and Scala [4]).

In one dog of this group (Dog 1013) there was an inequality of the postrotational nystagmus before operation (nystagmus to the right had longer duration than nystagmus to left). After left occipital lobectomy the relationship was reversed, the postrotatory nystagmus to the left being predominant for 18 days. After bilateral occipital lobectomy (three cats, four dogs) increase of the postrotatory nystagmus to either side prevailed.

The description of the effects of unilateral frontal lobectomy (studied in 19 dogs and two cats) may start with a consideration of the largest lesions, including Areas 4, 6, and 8 (Dog 125, Cat 182).

Dog 125

Date	Days Post-Oper.	Postrot. Ny. to L. After 10 Rot.		Postrot. Ny. to R. After 10 Rot.		Ratio Oper./Norm.	
		Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Durat.	No. of Jerks
4/27/44	..	6-7	7-8	7	5-9	1	0.93
4/28/44	..	8	6	7	6-7	0.87	1.08
4/28/44	Right frontal lobectomy (Fig. 2*A*)						
4/29/44	1	4-5	2-3	8-10	10-14	2	4.8
5/ 1/44	3	3	1-3	6-7	5-8	2.1	3.2
5/ 3/44	5	5-8	2-6	15-16	35-40	2.3	9.3
5/ 8/44	10	0-8	0-7	5	1-3	0.7	0.57

Cat 182

Date	Days Post-Oper.	Postrot. Ny. to L. After 10 Rot.		Postrot. Ny. to R. After 10 Rot.		Ratio Oper./Norm.	
		Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Durat.	No. of Jerks
8/ 7/44	..	6-7	6-7	7-9	8-10	1.2	1.4
8/ 8/44	..	6-7	6-8	7-8	7-10	1.1	1.2
8/ 9/44	Right frontal lobectomy (Fig. 2*B*)						
8/11/44	2	4-5	4-5	9-12	14-16	2.3	3.3
8/12/44	3	3-4	3	7-9	8-18	2.3	4.3
8/14/44	5	4-6	2-4	6	6	1.2	2.0
8/24/44	Found dead						

In these cases distinct directional preponderance, Type III (increase to the side operated on combined with decrease to the opposite side), appeared. It lasted over five days but subsided in the above cases within less than 10 days. In one dog, however (Dog 123), in which severe spontaneous epileptiform convulsions developed, the directional preponderance was observed for over two months. The development of the latter condition may be an auxiliary factor; however, it is dispensable.

In an attempt to localize, within the frontal lobe, the region responsible for the development of directional preponderance circumscribed partial lesions of various areas were produced. Contrary to our expectations, lesions of Area 8, the eye field, failed to produce directional preponderance. Combined lesions of Areas 8

and 6 produced only a very slight directional preponderance, Type II (decreased nystagmus to the opposite side, Dog 185). Lesions limited to parts of Area 6 or of Area 4 were unable to elicit directional preponderance. Definite preponderance appeared only after large combined lesions affecting Areas 4a, 4b, and 6 or their fiber connections (possibly also fibers from Area 8).

Among five dogs in which bilateral frontal lobectomy (or lobotomy) had been performed only one showed bilateral increase of nystagmus (Dog 117). In Dog 316 there was a transient increase on the ninth day on the right side. Otherwise, all dogs showed decrease of the duration and frequency of the nystagmus, which was observed up to 48 days (following protocol).

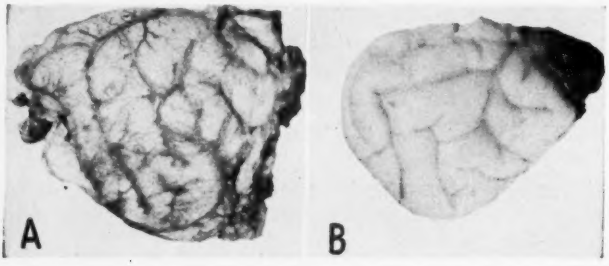

Fig. 2.—*A*, right frontal lobe extirpated (Dog. 125). In this animal a right occipital lesion was added later (see p. 9). *B*, right frontal lobe destroyed (Cat 182).

Dog 185

Date	Days Post-Oper.	Postrot. Ny. to L. After 10 Rot.		Postrot. Ny. to R. After 10 Rot.		Ny. to L.		Ny. to R.	
		Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Ratio After/Before Durat.	Ratio After/Before No. of Jerks	Ratio After/Before Durat.	Ratio After/Before No. of Jerks
10/ 3/44	..	6-7	6-7	8	9	...	...	...	...
10/ 4/44	..	7	7	7	7	...	...	...	...
10/ 4/44 Right frontal lobectomy									
10/ 6/44	..	5-7	5-7	6-9	6-10	...	...	...	...
10/10/44	..	3	2-3	4-5	4-5	...	...	...	...
10/24/44	..	3-4	3-4	4-5	4-5	...	...	...	...
10/24/44 Left frontal lobectomy									
10/25/44	1	0	0	3	1-2	0	0	0.4	0.2
10/30/44	6	0	0	3	1-2	0	0	0.4	0.2
11/ 8/44	14	1-3	1-3	4-5	4-5	0.2	0.2	0.6	0.56
11/15/44	21	0	0	1-3	1-3	0	0	0.2	0.2
11/27/44	33	0-1	0-1	3-4	3-4	0.07	0.07	0.5	0.4
12/12/44	48	0-2	0-1	3-4	3-4	0.14	0.07	0.5	0.4

Dog 117, which showed bilateral increase, had the smallest lesion. Similarly as was experienced in unilateral frontal lesions, the animal showed the increase of nystagmus, despite intactness of area 8. Also in this series a lesion of Area 4 did not seem a necessary prerequisite for development of a decrease of nystagmus (in Dog 280 there was a bilateral decrease, while Area 4 was intact on the left side).

In reviewing the effect of unilateral temporal lobectomy (six cats), one has to bear in mind a possible involvement of the optic radiation, since section of the optic tract (Spiegel and Scala [4]) produces directional preponderance, and a similar effect of occipital lesions has been observed in the present investigation. It seems, therefore, important to take into consideration the depth of the lesion. Accordingly, the material is divided into two groups: (1) superficial lesions limited to the cortex and

closely adjacent parts of the white matter (Cats 177, 381, 600) and (2) deep lesions reaching the lateral ventricle or the thalamus and thus interrupting the optic radiation (Cats 176, 391, 492). In the first group there was either no definite change of the postrotatory nystagmus following the operation (Cats 177, 600) or only a transitory change (Cat 381) explainable by encroachment of the lesion upon the lateral surface of the occipital lobe.

Cat 177		Postrot. Ny. to L. After 10 Rot.		Postrot. Ny. to R. After 10 Rot.		Ratio Oper. / Norm.	
Date	Days Post-Oper.	Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Durat.	No. of Jerks
3/13/45	..	13-15	20-21	13-16	23-25	1.03	1.17
3/14/45	..	11	18	11-12	19-20	1.04	1.08
3/15/45	Right temporal lobectomy (Fig. 3)						
3/17/45	2	10-11	17	12-13	17-22	1.2	1.1
3/19/45	4	12	13-15	11-13	12-15	1	.96
3/26/45	11	10-11	10-12	10-11	11-13	1	1.1
4/ 2/45	18	9	10	10	12	1.1	1.2
4/ 9/45	25	8-10	13	8-9	9-10	0.9	0.7
4/13/45	29	8-9	9-11	7-8	10-11	0.9	1.05

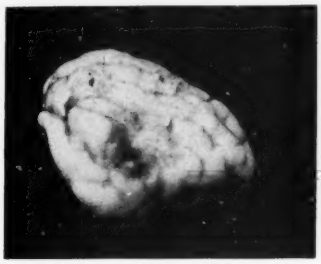

Fig. 3.—Superficial right temporal lesion (Cat 177).

The second group showed, as in the occipital lesions, directional preponderance chiefly due to increase of the nystagmus to the side of operation [5] (Type I in Cat 391, Type III then Type IV in Cat 492, Type IV in Cat 176).

In lesions of the temporal lobe encroaching upon the parietal lobe we found, likewise in a case of a deep-reaching lesion (Cat 230), directional preponderance, Type III, and in a superficial lesion slightly involving the anterior part of the occipital lobe, a transient directional preponderance involving in this case the frequency only (Cat 515).

These observations may explain, at least, partly, the clinical observations of Fitzgerald and Hallpike. The authors found in cases of lesions of the temporal lobe directional preponderance of caloric nystagmus to the diseased side; in view of the extent of these lesions, it seems not unlikely that the optic radiation was more or less affected.

Similar considerations apply to the parietal lobe. Our material comprises unilateral parietal lobectomy in three cats and six dogs. In the study of the parietal lobe it proved of importance to avoid not only injury to dorsal parts of the optic

5. This reaction seems to indicate that a decrease of nystagmus to the opposite side is not simply a phenomenon of shock, since there are in this group some large deep lesions without a decrease of the nystagmus to the opposite side.

radiation but also lesions of adjacent parts of the frontal lobe or of the area striata. One has to bear in mind that in the animals under study the area striata reaches rather far forward, and encroachment upon this area is probably responsible for the appearance of directional preponderance, Type II, in our cats.

Cat 229 is of interest in that no change was observed in the first three days after the lobectomy and a depression of the nystagmus to the opposite side was found on the fifth day after operation. The lesion slightly encroached upon the occipital lobe.

Cat 229

Date	Days Post-Oper.	Postrot. Ny. to L. After 10 Rot. Durat. in Sec.	Postrot. Ny. to L. After 10 Rot. No. of Jerks	Postrot. Ny. to R. After 10 Rot. Durat. in Sec.	Postrot. Ny. to R. After 10 Rot. No. of Jerks	Ratio Oper./Norm. Durat.	Ratio Oper./Norm. No. of Jerks
7/24/44	..	13-17	24-35	12-15	24-26	0.9	0.86
7/25/44	..	15-20	24-30	13-17	22-35	0.9	1.0
8/ 1/44	..	13	20	13-15	22-25	1.07	1.1
8/ 2/44	..	13	21-24	12	21-23	0.9	1.0
8/ 2/44 Right parietal lobectomy (Fig. 4)							
8/ 5/44	3	13	24	13-16	24-31	1.1	1.1
8/ 7/44	5	11-15	14-20	11-13	20-24	0.92	1.3
8/11/44	9	8-9	12-15	10-12	16-19	1.3	1.3
9/29/44 Sacrificed							

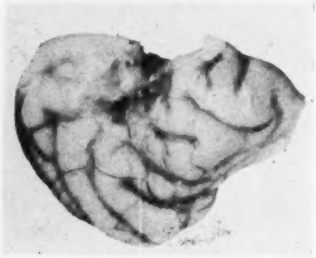

Fig. 4.—Right parietal lobe lesion (Cat 229).

In order to avoid impairment of adjacent areas, it was important to use simple mechanical ablation, with a sharp scalpel, of the gyri under study, instead of thermocautery, since the latter may cause thrombosis in vessels supplying adjacent parts of the frontal or the occipital lobe. In making the mechanical ablation, we were careful to leave the circulation to these adjacent areas intact. When these precautions were observed, lesions of the parietal lobe failed to produce directional inequality of the postrotatory nystagmus or produced only a slight increase in the frequency of the postrotatory nystagmus to the side operated on, lasting but three days.

In order to study the mutual relationship between the occipital and the frontal areas influencing the vestibulo-ocular reflex arc, occipital lobe lesions were produced after frontal lobectomy in a group of four dogs; frontal lobectomy followed ablation of the occipital lobes in a second group of four dogs. The typical consequences of unilateral occipital lobectomy regarding directional preponderance (Type I or III) were found in the absence of the frontal lobe of the same side (Dog 125, Fig. 2*A*; Dog 182) or of both frontal lobes (Dogs 185, 700). In other words, the efferent pathways from the frontal lobes are not necessary for the development of directional preponderance following occipital lobectomy. This situation does not exclude, of course, the possibility that a part of the efferent impulses from the occipital lobe to the vestibulo-ocular reflex arc are conducted by means of frontal lobe systems.

Unilateral frontal lobotomy or lobectomy following bilateral lesions of the occipital lobe was performed in four dogs. In one case (Dog 105) the right occipital lobe was completely destroyed; on the left side the ventral part of Area 17 was preserved; subsequent right-sided frontal lobotomy (in the lateral part of the hemisphere behind Area 3 and the largest part of Area 4) failed to produce directional preponderance. Only in Dog 115 did there develop a transient increase of nystagmus (one-day duration) after bilateral frontal lobectomy. However, the preceding bilateral occipital lesions had spared the ventral parts of the area striata on both sides. In the other two cases (Dogs 266, 289) unilateral frontal lobectomy produced only a depression of the nystagmus to the opposite side (Type II). Thus, if the lesion of the occipital lobe is extensive enough, it seems that subsequent frontal lobectomy is able to produce, at the most, a depression of the vestibulo-ocular reflex arc. The appearance of Type I of directional preponderance (increase of nystagmus to the side operated on) following frontal lobe lesions seems to require the preservation of at least a part of the homolateral area striata.

It appears significant that the reactivity of the vestibulo-ocular reflex arc is changed by lesions of the optic tract, of the external geniculate body, or of the

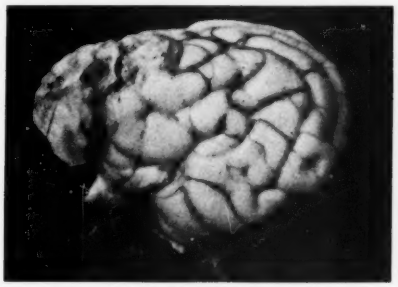

Fig. 5.—Left frontal lobe ablated following bilateral optic nerve section (Dog 1006).

superior colliculus (Spiegel and Scala [6]) in a manner similar to that observed after cortical lobectomies. The observations of Spiegel and Scala in the cat could be repeated in the dog.

In view of the similarity between the effect of cortical lesions upon the postrotational nystagmus and that of injury to the optic tract or the subcortical optic relay stations, the question arises whether and to what extent retinal impulses play a part in the mechanism of this cortical action upon the vestibulo-ocular reflex arc. In order to study this problem, both optic nerves were severed intraorbitally in a group of four dogs, care being taken that the motor nerves to the eye muscles were spared. After the resulting changes in the postrotational nystagmus had been observed for some time, unilateral occipital or frontal lobectomy was performed.

In agreement with the observations following section of the optic tract, it was found that bilateral elimination of retinal impulses induces a pronounced increase of the postrotational nystagmus in both directions, the average duration and number of jerks being augmented to a multiple of the preoperative values (particularly in

6. Spiegel, E. A., and Scala, N. P.: Effect of Quadrigeminal Lesions upon Labyrinthine Nystagmus, Confinia neurol. **7**:68, 1946.

Dog 1002). In this state of increased reactivity of the vestibulo-ocular reflex arc there appeared in all four dogs with cut optic nerves following rotation not only

Postrotatory Nystagmus After Bilateral Optic Nerve Section in Dogs

Date	Ny. to R. (No. of Jerks)	Durat. of Ny. to R. (in Sec.)	Ny. to L. (No. of Jerks)	Durat. of Ny. to L. (in Sec.)	Ratio Oper./Norm. No. of Jerks	Ratio Oper./Norm. Durat.
Dog 1003						
11/27/45	7-12	6-8	8-9	6-7	....	....
11/29/45	7-8	6-7	6-7	5-6	....	....
11/29/45 Both optic nerves sectioned						
11/30/45	14-17	13-15	31-51	19-35	....	....
12/10/45	10-23 R.	9-15	13-24 L.	15-17	....	....
	6-9 L.	22	5-8 R.	20	....	....
12/11/45 Left occipital lobectomy						
12/12/45 Spontaneous nystagmus → 6-8 jerks in 30 sec.						
12/14/45	25-27	16	25	15-16	0.98	0.97
12/18/45	28-31	16	29-30	16-19	1.0	1.09
Dog 1001						
11/25/45	11-16	6-10	6-9	5-7	....	....
12/ 4/45	7-8	6-7	7-8	6-7	....	....
12/ 4/45 Bilateral optic nerve section						
12/ 5/45	30-41	16-19	31-43	16-20	....	....
12/10/45	30-35 R.	17-20	27-32 L.	16-18	....	....
	2-6 L.	18-20	1-2 R.	.....	....	....
12/17/45	23-25 R.	14-15	24 L.	15	....	....
	13-14 L.	34-40	6-12 R.	30	....	....
12/17/45 Left occipital lobectomy						
12/18/45	22-24	12-14	23-34	13-15	1.2	1.07
12/21/45	23-25	14-16	23-26	14-15	1.01	0.97
12/26/45	18-21	13-14	20-26	13-14	1.1	1.0
Dog 1002						
11/26/45	7-11	6	7-11	6	....	....
11/27/45	4-5	4-5	4-5	5	....	....
11/28/45 Bilateral optic nerve section						
11/29/45	30-32	16-17	23-24	12-14	....	....
11/30/45	22-23	14-15	16	13	....	....
12/10/45	7-9 R.	5-8	7 L.	6	....	....
	36-120 L.	60-130	124 R.	125	....	....
12/18/45	12 R.	8	8 L.	8	....	....
	60 L.	73	36 R.	60	....	....
12/31/45	13 R.	9-10	9-11 L.	8	....	....
	33-58 L.	47-72	33-48 R.	50-54	....	....
2/ 4/46	13-18 R.	11-12	8-10 L.	8-9	....	....
	52-55 L.	65-75	64-68 R.	70-78	....	....
2/ 4/46 Left frontal lobectomy						
2/ 5/46	12-14 R.	10	12 L.	8-9	0.9	0.9
	23-27 L.	35	27-35 R.	35-40	....	....
2/14/46	13 R.	10	9-14 L.	9-11	0.9	1.0
	43-53 L.	63-64	30-55 R.	40-60	....	....
Dog 1006						
12/ 6/45	12-13	10	11-13	10	....	....
12/ 7/45	9-12	9-11	9	9	....	....
12/ 7/45 Bilateral optic nerve section						
12/10/45	36-37	25-27	54	33	....	....
12/12/45	43-47 R.	26-30	28-31 L.	20-21	....	....
	7 L.	30	3-4 R.	15	....	....
Spontaneous nystagmus → 8 jerks in 30 sec.						
12/18/45	33-44 R.	24-29	42-44 L.	27-28	....	....
	4 L.	30	1-2 R.	.....	....	....
12/31/45	43-51	28-33	41-43	29-30	0.89	0.98
1/ 8/46	34	23	40	24-26	1.17	1.08
1/ 9/46 Left frontal lobectomy (Fig. 5)						
1/10/46	40-42	22	46-49	24-26	1.1	1.1
1/14/46	36-38	22-24	53	31	1.4	1.3
1/17/46	33-38	23-25	44	28	1.2	1.1
2/14/46	28-35	19-24	44-48	27-30	1.4	1.3

the typical nystagmus in the direction opposite to that of the turning but also an "after-after nystagmus" in the direction of the rotation succeeding the typical nystagmus. Such an after-after nystagmus, consisting of only a few jerks, is occasionally

observed in human patients (Bárány); after elimination of the retinal impulses in these dogs the phenomenon was particularly marked (Table).

The state of excitation of lower vestibular centers apparently fluctuates periodically under normal conditions; when these centers are released from retinal inhibition, these fluctuations become markedly exaggerated.

After elimination of the afferent impulses from the retinas unilateral occipital lobectomy failed in the two cases studied to produce a directional preponderance (ratio side operated on: normal side unchanged regarding duration, only transitorily increased to 1.2 regarding number of jerks in Dog 1001). Unilateral extirpation of Areas 6 and 8 (Dog 1002) also did not induce this phenomenon, while a unilateral frontal lobectomy including Areas 6 and 8 and a large part of Area 4 was able to induce at least a slight prevalence of the postrotational nystagmus to the side of the cerebral operation (Dog 1006). Therefore, as far as this small group of experiments permits conclusions, it seems that the influence of the occipital lobe upon the vestibulo-ocular reflex arc depends to a greater degree on afferent impulses from the retinas than from the frontal lobe.

It seemed of interest to compare the effect of circumscribed unilateral cortical lesions or lobectomies with that of unilateral complete hemidecortication. Experiments on three dogs showed that the latter procedure induces a distinct directional preponderance (Types I, III, IV), similar to that observed in rabbits by Bauer and Leidler and Dusser de Barenne and de Kleyn. This directional preponderance is much longer lasting than that following the various lobotomies, as shown by the following protocol.

Dog 341

Date	Days Post-Oper.	Postrot. Ny. to L. After 10 Rot.		Postrot. Ny. to R. After 10 Rot.		Ratio Oper./Norm.	
		Durat. in Sec.	No. of Jerks	Durat. in Sec.	No. of Jerks	Durat.	No. of Jerks
12/19/44	..	7-10	14	8-10	14	1.05	1.0
12/20/44	..	7-8	9-12	7-8	9-10	1.0	0.9
12/20/44	Right hemidecortication; complete left hemiplegia (Fig. 6)						
12/22/44	2	10-12	19-30	17-19	38-43	1.6	1.65
12/28/44	8	20-21	30-33	19-22	32-38	1.0	1.1
1/ 5/45	14	14-15	23-27	18-20	37-40	1.3	1.5
1/13/45	21	15-16	26-28	18-20	33-35	1.2	1.2
2/ 5/45	42	14-16	22-23	14-16	24-26	1.0	1.1
4/ 9/45	98	10-13	17-22	13-15	23-27	1.2	1.2
2/19/46	1 yr., 2 mo.	9-10	13-14	15-17	30-31	1.6	2.2

Since various cortical areas, particularly in the frontal and the occipital lobe, may influence the vestibulo-ocular reflex arc, there seems to be the possibility that after unilateral extirpation of one of these foci a compensation by remaining parts of the cortex takes place. After unilateral hemidecortication such a cortical compensation, at least on the side of operation, can no longer play a role, and one deals with a summated effect of the release of the vestibulo-ocular reflex arc from the frontal, as well as from the occipital, areas. Retrograde degeneration in subcortical ganglia, particularly in the thalamus, appears, of course, not only after complete extirpation of the cerebral cortex but also after circumscribed cortical lesions. Therefore it may contribute to the difference between the directional preponderance following hemidecortication and that following lobectomy only to the extent that the summated effect of the degeneration of several subcortical nuclei may be more pronounced

than that of the degeneration of a single subcortical cell group. More important are unintended lesions to the optic tract, to the external geniculate ganglion, or to the superior colliculus, a system whose injury produces a marked directional preponderance (Spiegel and Scala [6]). In one of our cases of hemidecortication in which directional preponderance (first Type IV, later Type I) could be observed for one year after operation autopsy revealed destruction of the external geniculate ganglion, and of the lateral part of the superior colliculus on the homolateral side. Subsequently we attempted, therefore, to spare the opticomesencephalic system. The hemidecortication still produced a marked and long-lasting directional preponderance, with the optic tract, the external geniculate ganglion, and the superior

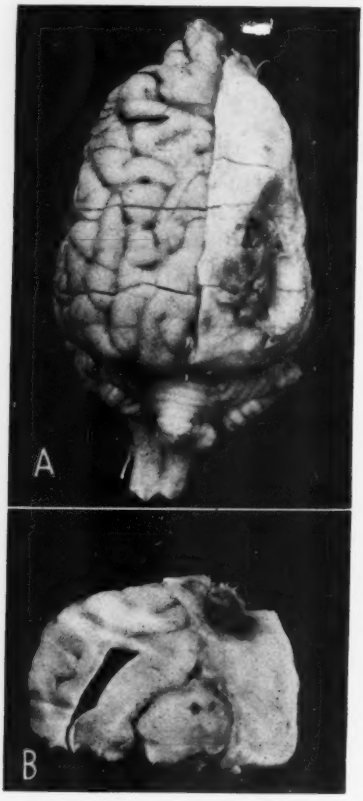

Fig. 6.—Right hemispherectomy (Dog 341). *A*, right hemisphere is replaced by a thick fibrous membrane. *B*, note atrophy of right mesencephalon.

colliculus intact on postmortem examination. However, even if lesions of subcortical ganglia are avoided as much as possible, a depression of their functional activity cannot be entirely prevented. One may observe that after hemidecortication a thick fibrous membrane develops, replacing the extirpated cortex. This membrane tends to shrink and to compress the underlying structures and to impair their blood supply, so that an atrophy of these parts of the brain stem results (Fig. 6).

Summing up, we are inclined to explain the observation that the directional preponderance is longer lasting after hemidecortication than after lobotomies by various factors: the summated effect of the elimination of all cortical centers influencing the vestibulo-ocular reflex arc and also of the retrograde atrophy of subcortical ganglia; unintended lesions of subcortical structures; atrophy en masse of subcortical areas due to the formation of a shrinking membrane replacing the extirpated cortex and impairing the underlying subcortical structures by compression and/or interference with their blood supply.

SUMMARY

The influence of various unilateral cortical lesions upon the ocular reactions to 10 alternate clockwise and counterclockwise rotations was studied in dogs and cats.

After occipital or frontal lobectomy the postrotatory nystagmus to the side operated on distinctly predominated over that to the normal side ("directional preponderance" i. e., increase in duration and number of jerks to the side operated on and/or decrease to the opposite side). The change lasted from a few days to two weeks after complete elimination of the area striata, 5 to 10 days after frontal lobectomy, and in one dog in which severe Jacksonian convulsions developed, over two months.

Superficial lesions of the parietal or the temporal lobe had only a slight, if any, effect upon the postrotatory nystagmus, while deep-reaching lesions of the latter lobe produced a definite directional preponderance, apparently due to injury of pathways connecting the area striata with the brain stem.

After bilateral optic nerve section the duration of the postrotatory nystagmus and of the number of jerks was increased to a multiple of the preoperative values. In this stage of increased reactivity of the vestibulo-ocular reflex arc some dogs displayed a pronounced postrotatory "after-after" nystagmus, the rotation being first followed by a nystagmus in the opposite direction and then one beating in the direction of rotation.

After elimination of the afferent impulses from the retinas unilateral occipital lobectomy failed to produce a definite directional preponderance, while unilateral frontal lobectomy, if extensive enough, was still able to induce a prevalence of the postrotational nystagmus to the side of the cerebral operation.

Unilateral hemidecortication produced a much more prolonged directional preponderance than circumscribed lobectomies. An analysis of this difference suggests the participation of subcortical factors, besides the summated effect of the release of the vestibulo-ocular reflex arc from the influence of frontal and occipital cortical centers.

HYDROTYMPANUM (SECRETORY OTITIS MEDIA)

Review of Literature and Presentation of Data on Thirty-Nine Cases

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AND
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MORE THAN 80 years ago Politzer [1] accurately described the accumulation of clear fluid in the middle ear as a clinical entity. Many articles describing this condition have appeared since that time, but only in the past few years has attention been directed toward investigation of the causative factors and the effective treatment.

Interest in this entity arose from the relative frequency with which we encountered it in the past three years. Our early experiences with this condition, which proved very obstinate in some instances, led to a thorough review of the literature in an attempt to determine the causes and the proper treatment. There appeared to be a wide range of possible causes, a lack of unity in methods of treatment, improper diagnosis in many cases, and numerous synonyms for the disease, all indicating the existing confusion. For these reasons, data and a review of the literature from 1940 to 1951 are presented in an effort to clarify the present concept of this troublesome disease.

TERMINOLOGY

The titles given to this condition are almost as numerous as the articles regarding the entity. In most of the articles a term indicating an infection of the tympanum or incorporating the rather nebulous term "catarrh" has been used. The descriptions have in common the fact that clear fluid is present in the drum and chronicity is a prominent feature. The title used by us was adopted from van Dishoeck [2] because it adequately describes the condition and does not suggest an unfounded infectious origin.

Morrison [3] has mentioned auditory tube obstruction, acute salpingitis, tubal catarrh, and tubal tympanic catarrh. Eagle [4] mentioned secretory otitis media, serous otitis media, catarrhal otitis media, nonsuppurative otitis media, hydrops of the middle ear, and tubal tympanic catarrh. At present, however, secretory otitis

From the Ear, Nose and Throat Clinic, Walter Reed Army Hospital, Washington, D. C.

1. Politzer, A.: Diseases of the Ear, revised by M. J. Ballin, Ed. 6, Philadelphia, Lea & Febiger, 1926.

2. van Dishoeck, H. A. E.: Hydrotympanum in the Different Clinical Aspects of Tubo-Tympanic Catarrah, Acta oto-laryng. **36**:429, 1948; abstracted, Excerpta Med. XI **2**:1516, 1949.

3. Morrison, W. W.: Diseases of the Ear, Nose, and Throat, New York, Appleton-Century-Crofts, Inc., 1948, p. 107.

4. Eagle, W. W.: Secretory Otitis Media, Ann. Otol. Rhin. & Laryng. **55**:55 (March) 1946.

media appears to be the most popular title. Jordan [5] and Hotchkiss [6] described chronic secretory otitis media. Kurozumi [7] used the term "middle ear catarrh." Hoople [8] spoke of otitis media with effusion. Tremble [9] called it "secretory effusion of the tympanum." Barnes [10] distinguished between hydrotympanum and secretory otitis media. Tobey [11] wrote of acute catarrhal otitis media with effusion. Robison and Nicholas [12] described catarrhal otitis media with effusion. Ballenger and Ballenger [13] used the term "secretory (catarrhal) otitis media." Jackson and Jackson [14] used the lengthy names of secretory transudative and secretory exudative middle ear disease. The latter distinction is not too clear and appears dependent upon the thickness of the fluid.

INCIDENCE

Whether there has been an actual increase in the number of cases of hydrotympanum in the past 12 years is not known, but there has been a definite increase in the number of articles written on the subject. Eagle [4] and Hotchkiss [6] do not believe that an increased vigilance is the reason for the great number of cases being reported. The former stated that until 1940 the disease was not given serious consideration and that there seems to have been a mild epidemic during the years 1942 through 1946.

The condition does not seem to be limited geographically, climatically, or seasonally. At the Walter Reed Army Medical Center patients from all parts of the world have been seen in whom the disease has developed without respect to climate, race, or age. Eagle [4] stated, however, that more cases occur in the winter months. Tremble [9] believes that it is more prevalent during the spring and fall, when changeable weather and upper respiratory infections abound.

In our group there has been a year round incidence, but with an apparent increase during the seasons with changing weather. A survey of clinical catarrhal otitis media records at this hospital from 1947 to 1951 revealed no mention of fluid in the middle ear. This fact would indicate that either hydrotympanum was not present or it was not recognized and would stress the importance of differentiating the previously mentioned synonymous terms and hydrotympanum.

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5. Jordan, R.: Chronic Secretory Otitis Media, Laryngoscope **59**:1002 (Sept.) 1949.

6. Hotchkiss, W. T.: Chronic Secretory Otitis Media, South. M. J. **41**:727 ((Aug.) 1948.

7. Kurozumi, S.: The Hearing Loss of Tubal Middle Ear Catarrh in Reference to the Negative Pressure and the Exudate in the Tympanic Cavity, J. Oto-rhino-laryng. Soc. **53**:11, 1950; abstracted, Excerpta Med. XI **4**:253, 1951.

8. Hoople, G. D.: Otitis Media with Effusion: A Challenge to Otolaryngology, Laryngoscope **60**:315 (April) 1950.

9. Tremble, G. E.: Secretory Effusion of the Tympanum, Laryngoscope **61**:791 (Aug.) 1951.

10. Barnes, L. J.: Secretory Otitis Media: A Review of the Literature, Tr. Pacific Coast Oto-Ophth. Soc. **31**:79, 1950.

11. Tobey, H. G.: An Acute Catarrhal Otitis Media with Effusion, Tr. Am. Otol. Soc. **36**:51, 1948.

12. Robison, J. M., and Nicholas, H. D.: Catarrhal Otitis Media with Effusion: A Disease of the Retropharyngeal Lymphatic System, South. M. J. **44**:777 (Sept.) 1951.

13. Ballenger, W. L., and Ballenger, H. C.: Diseases of the Nose, Throat, and Ear: Medical and Surgical, Ed. 8, Philadelphia, Lea & Febiger, 1943.

14. Jackson, C., and Jackson, C. L., editors: Diseases of the Nose, Throat, and Ear, Including Bronchoscopy and Esophagoscopy, Philadelphia, W. B. Saunders Company, 1945.

ETIOLOGY

We have found more than 10 possible causative factors advanced by various authors.

A. *Lymphoid Tissue.*—Morrison [3] stated that adenoid hyperplasia in children is a frequent cause. Shahinian [15] and Ballenger and Ballenger [13] blame lymphoid hyperplasia in the nasopharynx. It is our opinion that many more children have this condition than is clinically noted. In 4 of our 39 cases the patients were children, and these were referred only after antibiotic treatment had failed. Robison and Nicholas [12] stated that the retropharyngeal lymph nodes, which drain structures developing from the first branchial pouch, may be the cause of obstruction in the Eustachian tube. They believe that these nodes, particularly in children, are responsible for most instances of catarrhal otitis media with effusion. Wolff [16] and Eggston [17] were unable to substantiate claims that enlargement of lymph nodes could cause stenosis of the Eustachian tube.

B. *Tumor of the Nasopharynx.*—Tremble,[9] Barnes,[10] and Robison and Nicholas [12] mentioned the frequent finding of fluid in the middle ear before a diagnosis of nasopharyngeal malignant tumor could be made. This is stressed in our experience by several cases of nasopharyngeal malignant tumor in which hydrotympanum occurred very early in the disease. Hydrotympanum was found in 7 of the 12 cases of nasopharyngeal malignant tumor encountered in this hospital from 1947 to 1952. There were symptoms of middle ear disease in other cases, but fluid was not noted.

In two of the seven cases there was persistent fluid without evidence of tumor, despite repeated mirror and nasopharyngoscopic examinations. In the first case, involving a 49-year-old white man, several nasopharyngeal biopsies giving negative results were done over a period of nine months, during which time some 50 evacuations of middle ear fluid were done. A diagnosis of transitional-cell carcinoma was finally established by biopsy of a cervical node. In the second case, involving a 52-year-old white woman, fluid was withdrawn from the middle ear on several occasions over a four-month period before a suspicious area appeared on the torus which proved to be undifferentiated carcinoma.

In the third case, involving a white man, the diagnosis was transitional-cell carcinoma of the fossa of Rosenmüller with typical hydrotympanum. In the fourth case there was involvement of the right ear for at least two years before biopsy was done. In the fifth case deafness and a sense of fulness in the head were present nine months before a diagnosis was made.

In the sixth case there were three episodes of deafness, tinnitus, and fluid in the middle ear on the side of the nasopharyngeal involvement. Symptoms were present two years before a diagnosis was made. After irradiation the symptoms subsided but recurred again a year later. A year and a half passed before there was a recurrence in the nasopharynx. Again, after another course of irradiation, the symptoms subsided. Two years later the middle ear involvement symptoms returned, and after a four-month period recurrence was again proved by biopsy, and another full dose of irradiation cleared the symptoms.

15. Shahinian, L.: Fluid in the Middle Ear, Arch. Otolaryng. **38**:328 (Oct.) 1943.

16. Wolff, D.: Personal communication to the authors.

17. Eggston, A. A.: Personal communication to the authors.

In a seventh case the diagnosis was nasopharyngeal cancer with extension to the left maxilla and cervical nodes. On admission there was serous fluid behind the left drumhead, which disappeared after irradiation.

Despite repeated negative findings by clinical and laboratory means, these cases should lead one to keep in mind the possibility of malignant tumor of the nasopharynx as a cause of hydrotympanum.

Robison's and Nicholas' [12] supposition that involvement of the retropharyngeal lymph nodes from a nasopharyngeal malignant lesion results in stenosis of the Eustachian tube may explain why hydrotympanum may occur months before a diagnosis of nasopharyngeal malignant tumor can be made.

We have no anatomical or pathological evidence that involved retropharyngeal lymph nodes can produce stenosis of the Eustachian tube. However, in view of the strong clinical evidence in the seven cases reported, we feel that blockage of the Eustachian tube is a definite etiological factor.

C. *Nasal Infections.*—Several of the writers mentioned have considered the occurrence of serous otitis media with, or after, upper respiratory infection and sinus disease as a result of inflammatory swelling of the Eustachian meatus and tubal block. The clinical association is of such frequency that this possibility cannot be overlooked. Morrison [3] doubts such causes, except in the case of chronic sniffing in which there is proneness to this condition. In a series of 39 cases we obtained a history of preceding upper respiratory infection in 11 cases.

D. *Nasal Allergy.*—Nasal allergy, with varying degrees of importance, has been considered an etiological factor by several writers. Jordan [5] stated that allergy was a factor in 75% of the cases. In contrast, Robison and Nicholas [12] feel that allergy is of no significance, since 100 examinations of fluid for eosinophile cells gave negative results. In our series we found allergic symptoms present in nine cases and a history of allergy in seven, but in none of the cases were cells found in the fluid. In only one case was there a significant eosinophile count on examination of nasal smear. Allergy, we feel, is not a factor.

E. *Air Travel.*—Tremble [9] and others believe that increased air travel partially explains the increased incidence of the disease. In the past two years thousands of patients from all over the world have arrived at this installation by air evacuation. There were no cases of hydrotympanum resulting from these flights, although a number of people had complaints of acute aerotitis, but no fluid was noted.

F. *Chronic Nasal Infection and Deformities.*—Writers have frequently referred to chronic rhinitis or sinusitis, septal deformities, and other intranasal deviation from the norm as possible etiological factors. In none of our cases could we prove that sinus disease or other intranasal abnormality caused this condition.

G. *Attenuated Otitis Media.*—Hotchkiss [6] and Tremble [9] believe that antibiotics modify the development of acute suppurative otitis media so that the purulent and painful stages are avoided. Robison and Nicholas [12] feel that antibiotics sterilize the fluid in acute purulent otitis media, allowing the infection to pass into the subacute stage, which they believe is the picture of chronic otitis media with effusion.

Many of our patients had full antibiotic treatment. These appeared to behave clinically in much the same manner as those not having had antibiotic treatment.

H. *Malocclusion.*—There is an increasing amount of literature on malocclusion as one of the causes of deafness and tinnitus. Seaver [18] believes that malocclusion decreases the chewing action and inhibits swallowing reflexes which in turn affect the tubal muscles. This process is thought to be unfavorable for the free flow of blood and lymph from the Eustachian tube area, thus inhibiting normal aeration of the middle ear, resulting in stasis.

In studies of aerotitis media cases, recorded by the thousands in the past 10 years, Kelly and Langheinz [19] and Bierman and Brickman [20] believe malocclusion to to be a very important factor in interference with lymphatic drainage of the ear. In the former writers' 50 cases relief was provided in 96% by correction of the bite. Even in those cases in which there was a large adenoid mass, improvement occurred. The latter believe that ear blockage occurred three to five times as frequently in cases in which malocclusion was present. Guild, as cited by Kelly and Langheinz,[19] hypothesized that free lymphatic drainage is impeded by fascial and muscle tension arising from abnormal jaw movements.

I. *Viral and Bacterial Infections of the Middle Ear.*—Low-grade infections of the Eustachian tube and drum have been described as a possible cause of this disease. Diversity of opinion exists as to whether or not there is a hypovirulent form of the infection involving the Eustachian tube or the middle ear. Tobey [11] considers two possible causes: one, a virulent infection, and the other, new types of infection. The former view is supported by Lederer,[21] who feels that untreated or recurrent serous otitis media is one of the commonest causes of chronic adhesive otitis media associated with loss of hearing. In contrast, Morrison [3] believes that the chronic type is an extremely mild form of inflammation of the middle ear and rarely occurs as a result of chronic tubal obstruction. He further expressed doubt that it would occur after an acute process, with the resulting retention of the thick secretions in the middle ear leading to thickened mucosa, scarring, and calcification. Regarding new types of infection, Tobey [11] based his reasoning on a study of cases of atypical pneumonia due to a filtrable virus which led to the discovery of a pharyngeal type of infection with severe dysphagia. These cases presented negative findings which he considered to be indicative of a prodromal stage of an upper respiratory infection preceding serous otitis media. He wonders if this particular virus has a predilection for the middle ear, with Eustachian tube blockage being a secondary effect of the middle ear infection.

Other writers have suggested that a virus may be the cause. Robison's and Nicholas' [12] work appears to be the first attempt to investigate a viral origin for hydrotympanum. In their investigation they injected white mice with fluid removed from the ears of 17 patients. They also passed some fluid through a Berkefeld

18. Seaver, E. P., Jr.: The Malocclusion Factor in Obstruction of the Eustachian Tube, Ann. Otol. Rhin. & Laryng. **59**:391 (June) 1950.

19. Kelly, W. J., and Langheinz, H. W.: Dental Treatment for the Prevention of Aerotitis Media, Ann. Otol. Rhin. & Laryng. **55**:13 (March) 1946.

20. Bierman, H. R., and Brickman, I. W.: The Relationship of Dental Malocclusion to Vacuum-Otitis Media and the Use of Dental Splints During Descent from Altitudes, Ann. Otol. Rhin. & Laryng. **55**:5 (March) 1946.

21. Lederer, F. L.: Diseases of the Ear, Nose, and Throat, Philadelphia, F. A. Davis Company, 1938.

filter and injected the filtrate into embryonated eggs. Egg material was then passed into mice, but reactions occurred in neither case. This material was also instilled into the respiratory tract and intracranially without reaction. This observation gave presumptive evidence that the fluid was bacteria- and virus-sterile. There was an epidemic of a disease that was presumed to be of virus origin, and in some of the patients vertigo developed, with or without hydrotympanum. Fluid from the middle ear of these patients was obtained and injected intracerebrally into mice, resulting in a circling movement of the mice. This phenomenon was then transmitted by triple transfer through the mice. From this experiment the following ideas were derived: 1. The fluid of otitis media with effusion is sterile for bacteria and viruses. 2. In systemic virus infection it is possible to isolate a virus from the fluid of involved ears. 3. The virus may be present in the retropharyngeal lymph nodes and may cause swelling leading to tubal blockage and effusion of the middle ear, which is sterile.

In our cases we obtained no bacteriological findings on culture, and no cells were found on examination of the smeared fluid. In examination of fluid in a typical case the staff of the Army Research Laboratory for Virus and Rickettsial Diseases found no virus in the fluid. Our conclusions tend to confirm Robison's and Nicholas' [12] findings. If a low-grade infection, whether of viral or bacterial origin, was present in the ear, some laboratory indication should have been obtained. We therefore feel that infection is not a direct cause of hydrotympanum.

PATHOLOGY

Proof of the true pathological process in this condition is difficult to obtain. Clinical impressions gained through study of many cases have formed the main background for classification of the condition into acute and chronic types. Nowhere in the literature was there an actual pathological report of this condition. Very little more has been added from the few surgical cases reported in the literature. The gross findings from a case in which mastoidectomy was performed by Jervey are discussed at the end of a paper on chronic secretory otitis media by Hotchkiss.[6] One of our consultants, William H. Jenkins,[22] encountered a case involving very refractory conditions in which x-ray examination of the mastoids showed slight clouding of the involved side. A mastoidectomy revealed only a thin yellow fluid in the mastoid cells without evidence of other gross pathological conditions.

SYMPTOMS AND DIAGNOSIS

Eagle [4] stated that very slight or no pain is characteristic, but we found pain a frequent, though mild, complaint in 16 of 39 cases. Loss of hearing, tinnitus, and autophony were frequently noted, along with a feeling of fulness or numbness within the ear or even about the side of the head. A feeling of fluid or crackling in the ear was sometimes noted, especially on vigorous movement of the head or on blowing the nose. A mild form of vertigo was often the only complaint. Eagle [4] and Barnes [10] noted improvement in hearing when the head was bent forward. Fever in the absence of an upper respiratory infection was not noted by us.

Morrison [3] found that the drumhead was retracted, with a prominence of the short process, the handle of the malleus appeared lighter in color, and the light

22. Jenkins, W. H.: Personal communication to the authors.

reflex changed in shape and width. The thickness of the drumhead may vary from normal or thin to thick and opaque in chronic cases. When the drumhead is not thick, the color may be bluish-gray or amber. When the drum is partially filled, a fluid line may be in a horizontal plane or may rise or dip from either side toward the malleus. In some cases bubbles may be seen. In old cases in which there are opaque drumheads the diagnosis may be made from the history and from the use of the Toynbee tube. Morrison [3] described the sound in these cases as a bubbling squeak.

Eagle [4] described a red, or raw, appearance of the bony part of the canal and noted a tendency toward easy bleeding. He considered mastoid x-ray examination of no value. Jenkins [22] and others mentioned slight haziness seen in mastoid x-ray examination. The diagnosis may be missed, as Hotchkiss [6] remarked, in cases in which there are opaque drumheads. It is stated that in half the cases there is a moist bubbling sound on inflation and in the remainder there is a half-choked sound. They found no bacteria and no eosinophiles. Barnes [10] stated that there is sudden onset of deafness, without pain, usually unilateral. The side of the head is heavy, and symptoms are improved with the head turned forward but may recur with resumption of a normal position. Their audiometric examinations showed a conductive-type curve of 30 db. average in the upper frequencies which varied with the amount of fluid. In our cases hearing improvement was noted, both subjective and objective, after aspiration of fluid. Robison and Nicholas [12] consider the commonest symptoms to be autophony, a sense of fulness, partial deafness, and tinnitus.

Hoople [8] described the drumhead as being a shade of amber, with a chalky color of the malleus' handle, a wrinkled appearance of the drumhead, and an oil-paper-like appearance of the drumhead in old cases. He described the fluid as serous, or thick, mucus.

Tremble [9] noted a fluid line below the umbo extending completely across the drumhead, while a higher line reached about halfway across. In the latter cases the author found a continuation on a different plane and angle in many instances.

Wible [23] has reported a previously unmentioned finding of a bleb surrounding the umbo which was present in the drumhead. After drainage symptoms subsided (Graph).

TREATMENT

Methods of treatment of hydrotympanum have varied from little more than the administration of nose drops to mastoidectomy. For many years little more than Eustachian tube inflation was used or was used in conjunction with bouginage, administration of drops, and pneumomassage.

Jenkins [22] found that the use of thyroid extract was of definite benefit in some cases. Morrison [3] feels that care of any underlying inflammation of the nose and throat, with gentle daily inflation of the tube, should be carried out primarily. He mentioned that a gum elastic bougie could be used in the subacute stages or that puncture of the drumhead should be done.

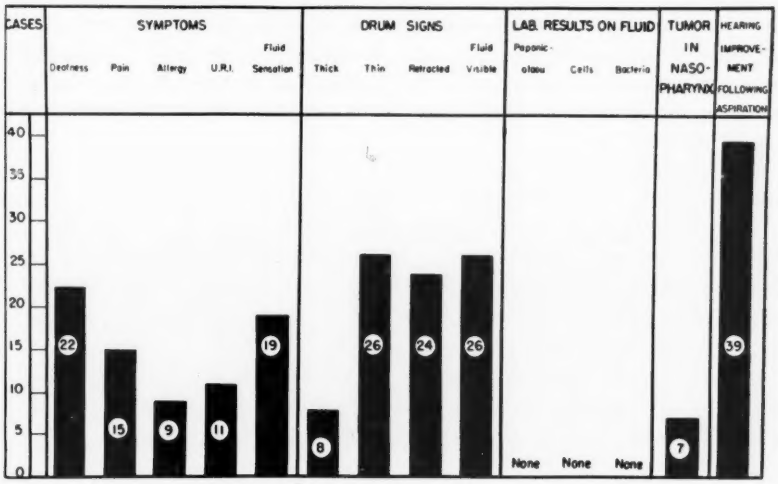
Eagle [4] condemned conservative treatment. He employed myringotomy and aspiration and opened the drum as often as necessary. In 75% of his cases there

23. Wible, L. E.: Umbo in Secretory Otitis Media, A. M. A. Arch. Otolaryng. **55**:468 (April) 1952.

were no recurrences, in only 25% were there over three myringotomies, and infection was rare.

Hotchkiss,[6] among 30 cases, encountered chronic cases lasting ½ to 3½ years, despite aspirations and other usual treatment. In conjunction with myringotomies he catheterized under view of the nasopharyngoscope and with the use of constant air pressure. In instances of persistent conditions he used an ophthalmic trephine to obtain permanent openings. Simple mastoidectomy was performed in one case.

As reported by Dysart,[24] Haines and Harris believe that 90% of 732 patients with aerotitis media benefited from radium therapy. Kelly and Langheinz [19] feel that interference with lymph drainage due to malocclusion was a factor in 50 cases. In 96% of these cases, even those in which there were adenoids, relief was obtained by correction of the malocclusion. Bierman and Brickman [20] found that ear blockage developed three to five times as frequently in people with malocclusion. They fol-



Graph giving pertinent findings in 39 cases of hydrotympanum.

lowed Costen's hypothesis that closing of the bite causes compression on the auditory tube by the external pterygoid muscle. Overclosure shortened the tensor veli palatini and made its action in opening the auditory tube less effective. They noted that jaw movement was more effective in opening the Eustachian tube than were the patient's attempts to inflate the drum by pressure.

The following is the technique of aspiration used in this clinic:

1. An ordinary 22-gauge spinal needle is altered so that the bevel is 45 degrees and is bent slightly so that the point may be seen over a 5-cc. syringe when the aspiration is done.

2. The ear canal is cleansed of wax.

3. The drumhead is punctured in the posteroinferior quadrant, and care is taken not to advance the needle once the bevel is through.

24. Dysart, B. R.: Otitis Media and Complications: Summaries of the Bibliographic Material Available in the Field of Otolaryngology, Arch. Otolaryng. **47**:509 (April) 1948.

Hoople [8] mentioned having seen the drum refill in three aspirations done at the same sitting, indicating that the mastoid cavity was filled with the fluid.

In cases of long duration fluid is thicker, often making it impossible to drain the drum through a needle. In such cases myringotomy followed by application of air pressure through the Eustachian tube to blow the jelly-like mass through the incision has been recommended by Eagle [4] and others.

Spot suction and inflation have been used after aspiration, but head noises continued. Robison and Nicholas [12] made a semipermanent opening by the use of fulguration. They have used this in only a few cases in which the fluid persisted one to three years. They felt that it was important to remove the congealed protein before fibrosis and epithelization occurred and stressed the importance of this protein in the fluid. It was thought that the protein remained after the water had been absorbed, resulting in a higher osmotic pressure and a rapid filling of the middle ear.

The above measures are directed toward removal of the fluid before it jells and before the irreversible changes seen in chronic cases occur. The importance of this care cannot be overemphasized. Unfortunately, not all patients will respond well to this treatment. Our experiences lead us to the belief that all prolonged recoveries must be carefully evaluated and those causes which may lead to a blockage of the Eustachian tube kept in mind.

We have adopted the Papanicolaou technique for smears of the posterior nasopharyngeal wall, as used by Morrison, Hopp, and Wu,[25] to screen cases of persistent conditions for malignant tumor of the nasopharynx, but we have not, at this time, obtained positive results from a smear in a previously unconfirmed case. Results obtained by Morrison, Hopp, and Wu [25] justify the incorporation of this aid. Of the patients we have seen several have been children, and dramatic response to thorough adenotonsillectomy has been noted.

Robison [12] feels that obliteration of the cavity containing the fluid, either by simple or by modified radical mastoidectomy, did not help, since the primary stenosis of the Eustachian tube remained, allowing continued accumulation of the fluid.

In the eradication of lymphoid tissue of the nasopharynx he stressed the importance of removing, with biting forceps and under vision of the nasopharyngoscope, the superior part of the lateral pharyngeal fold. Following this procedure, and at several sittings, he advised removal of the posterosuperior margin of the Eustachian meatus.

SUMMARY

A review of the literature on fluid in the middle ear, covering the period from 1940 to 1951, is presented, together with a study of 39 cases.

It is apparent that there is overlapping and confusion as to the terms used to describe this entity.

The term "hydrotympanum" is suggested as the simplest, most adequate, and most accurate title and one which does not convey an impression of an unfounded infectious origin.

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25. Morrison, L. F.; Hopp, E. S., and Wu, R.: Diagnosis of Malignancy of the Nasopharynx: Cytological Studies by the Smear Technic, Ann. Otol. Rhin. & Laryng. **58**:18 (March) 1949.

Interest in this condition has risen in the past 12 years and may account for the apparent reported increased incidence. Examination of this hospital's records of cases of catarrhal otitis media for the years 1947 to 1951 revealed no mention of hydrotympanum.

Many etiological factors have been considered: lymphoid hyperplasia in the nasopharynx, stenosis of the Eustachian tube from retropharyngeal lymphadenitis, nasopharyngeal malignant tumor, nasal infections and deformities, nasal allergy, increased air travel, attenuated middle ear infections, malocclusion, and viral and bacterial infections of the middle ear. In 7 of 12 cases of nasopharyngeal malignant tumor hydrotympanum was presented as a very early complaint, frequently years before the diagnosis was made. The condition subsided after irradiation of the lesion. In one case this cycle was presented three times. In the 39 cases of hydrotympanum studied none of the factors could be proved significant, except for varying degrees of Eustachian tube blockage. No laboratory evidence has been found to support the theory of allergic, bacterial, or viral involvement of the ear.

The symptoms and signs present in this condition are reviewed.

The accepted treatment requires evacuation of the fluid, usually by needle aspiration, followed by inflation and correction of the causative blocking factor. Resistant conditions require persistent efforts to maintain effective drainage and to rule out, by use of the Papanicolaou smear technique and/or by biopsy of the nasopharynx, nasopharyngeal malignant tumor as a cause of hydrotympanum.

MYOSARCOMA OF TRACHEA ASSOCIATED WITH RIEDEL STRUMA

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PRIMARY tumors of the trachea are extremely rare, the ratio between them and tumors of the larynx varying from 1 : 300 to 1 : 800, according to different authors. Among tracheal neoplasms, sarcomas are even rarer than others. Schiffner, for instance, surveyed the literature up to 1945 and accepts only 36 cases as histologically verified.

The case reported here is considered interesting, not only on account of the type, location, etc., of the tumor but also from a clinical point of view.

REPORT OF A CASE

Mrs. F. B., a married white woman aged 54 years, was admitted to the Jackson Memorial Hospital, Miami, Fla., on Aug. 28, 1950, from the emergency room, where she came because of extreme dyspnea. Oxygen by mask was instituted in the emergency room and was continued during x-ray and medical checkup. The patient was then admitted to the bronchoscopic service of the department of otolaryngology.

Admission Data.—The patient gave a history of respiratory difficulty and a sensation of choking starting four weeks before admission and increasing in severity. She had little or no coughing. She had to sit upright in bed, and any exertion increased the dyspnea. There was no history of a previous similar attack. She was in her usual good health prior to onset of the present illness, being employed as a domestic, in addition to doing her own housework.

Medical Examination.—The patient was an obese woman with acute respiratory embarrassment. The head was large, with no apparent abnormalities. The neck was very thick, with no palpable nodes or masses. The lungs were clear to auscultation, but there were a wheeze and musical rales heard over practically the entire chest. The heart seemed slightly enlarged to the left; the sounds were clear, with regular rate and rhythm and no murmurs. Pulse rate was 92 beats per minute. The abdomen was very large and obese, with no palpable masses or tenderness. There was no edema of the extremities. The nose and throat were essentially normal. Blood pressure was 194/114, temperature was 98.6 F., and respiration was 20.

Laboratory Data.—Kahn test and VDRL test reactions were negative. Urine was amber color and acid, with a specific gravity of 1.020, a trace of albumin, occasional red blood cells, 6 to 8 pus cells and 1 to 3 epithelial cells per cubic millimeter, and occasional mucous shreds. The red blood cell count averaged 4,830,000 per cubic millimeter, white blood cell count 12,000, hemoglobin 91% (14 gm. per 100 cc.), stab forms 4%, segmented forms 84%, lymphocytes 11%, and monocytes 1%.

X-Ray Examination (Aug. 28, 1950).—The heart was markedly enlarged to both the right and the left and of characteristic hypertensive shape. The aorta was sclerosed and tortuous. The left diaphragm was slightly elevated, but there was no obliteration of the costophrenic angles.

From the Ear, Nose, and Throat Department (Dr. McKenzie) and the Department of Pathology (Dr. Rezek), Jackson Memorial Hospital.

The lungs both showed essentially normal aeration, with possibly a slight increase of hilus markings on the left. There was no evidence of atelectasis or other unusual findings to account for severe dyspnea. In the lateral film at the level of the arch of the aorta there was a circular density about 1.5 to 2 cm. in diameter which was not definitely localized but appeared to be in the main bronchus or the trachea.

The above data were reviewed, and the patient was examined. No additional findings of importance were noted. By that time the patient was showing some cyanosis, even while using the oxygen mask, and it became evident that an airway had to be established at once.

An emergency bronchoscopy was performed without the use of anesthesia or preoperative preparation of any kind. With intranasal catheters supplying oxygen, an 8 mm. bronchoscope was passed directly into the trachea. At approximately 20 cm. below the teeth, a large mass was encountered obstructing the trachea. This mass was dark in color and fairly smooth and soft, giving somewhat the appearance of a cyst or an unusual polyp. It seemed to be attached to the anterior wall, and with the patient in the horizontal position, it practically occluded the airway. It was possible to pass the bronchoscope beyond the tumor mass, immediately permitting the patient to breathe freely. Oxygen was then supplied through the scope. Further examination revealed that the tumor continued down along the left side of the trachea to the orifice of the main stem bronchus. Because of the size of the tumor, it was believed unwise to attempt removal through the bronchoscope at that time. The condition of the patient being satisfactory, a tracheotomy was performed by an attending surgeon with the use of local aneshesia and with the bronchoscope in place to maintain an airway. It was found that the usual low tracheotomy opening was above most of the tumor, and the regular tracheotomy tube was inadequate. A very long tube was improvised by welding an inner cannula to the outer cannula of a No. 6 tube and then cutting about 1 in. (2.5 cm.) from the end of it. This provided an airway to just above the carina. A major part of the tumor was then removed for biopsy.

The improvised tracheotomy tube worked well, except for some difficulty in keeping it clean. A second emergency arose two days after operation, when a sloughing piece of tumor became lodged at the level of the distal end of the tracheotomy tube and obstructed the airway. This obstruction was quickly relieved by once again introducing an 8 mm. bronchoscope and removing the piece of tumor.

Reexamination by x-ray on Sept. 2, 1950, showed that the previously described nodule seen within the trachea, or main stem bronchus, was no longer demonstrable.

Microscopic and Pathological Examination and Diagnosis.—Biopsy of the tracheal tumor was done. A section showed pieces of mucus and serous glands associated with inflammatory elements and coated by ciliated columnar epithelium originating from the bronchial or the tracheal mucosa. There were also two pieces of tissue present composed of a very fast-growing malignant mesenchymatous tumor, the single cells differing in size, form, and staining qualities. The nuclei showed bizarre outlines; many mitoses were present, and numerous blastomatous giant cells were seen. The existence of newly formed blood vessels was very outstanding and in direct connection with this fast-growing tumor. One of us (P. R. R.) considered the tumor to be malignant mesenchymoma (angioplastic myosarcoma).

Treatment.—The patient was then referred to the x-ray department for therapy. She received 200 r units to the anterior mediastinum daily for a total dose of 3,000 r. As treatment progressed, her breathing became easier.

The patient underwent bronchoscopy on Sept. 12, 1950, under tetracraine (pontocaine®) hydrochloride anesthesia. An 8 mm. bronchoscope was passed to examine the site of the tumor under treatment by x-ray. It was found that the tumor had almost disappeared from the trachea. The mucous membrane had a red roughened appearance, and the lumen seemed smaller than normal.

Favorable progress continued for the next two weeks, by which time she could breathe fairly well with the tracheotomy tube plugged. Bronchoscopy was again done on Sept. 26, 1950, and no tumor could be identified in the trachea. While the scope remained in place, several extra-long tracheotomy tubes of regular type were tried until one was found that had sufficient length but did not obstruct the trachea. It was decided to permit the tube to remain in place, even though there was apparently a sufficient airway to allow normal breathing. This decision

was made because it was the opinion of our pathological and x-ray staffs that, while the tumor had practically melted away under the x-ray treatments, it would very likely recur at an early date.

The patient was instructed in the care of her tracheotomy tube. She was permitted to leave the hospital on Sept. 29, 1950, and was to report once a week to the Ear, Nose, and Throat Outpatient Clinic to have the tube changed.

The patient reported to the Outpatient Clinic as instructed. On Oct. 11, 1950, an attending physician removed the tracheotomy tube and advised the patient to dress the wound at home. She continued without complaints until Oct. 22, when she again began to have some difficulty breathing, after contracting mild upper respiratory inflammation. She came to the emergency clinic on Oct. 24, very apprehensive and moderately dyspneic; the temperature was 97 F., pulse rate 100 beats per minute, and respiration 28. A chest x-ray showed some increased density at the right base and cardiac enlargement. The patient then disappeared from the emergency clinic and was not seen again until Nov. 6, when she returned, with mild obstructive stridor and moderate dyspnea. After some sedation, she insisted upon going home. She again came to the Ear, Nose, and Throat Outpatient Clinic on Nov. 8, with marked dyspnea, and was readmitted to the hospital.

Upon admittance on Nov. 8, 1950, the patient was apathetic and in evident respiratory distress. Blood pressure was 200/120, pulse rate 76 beats per minute, respiration 20, and temperature 98.2 F. The tracheotomy fistula was well healed over. There were no palpable nodes about the neck. Rales were heard at each lung base, and breathing was tubular in type. The heart was enlarged to the left, and there was a soft systolic murmur over the aortic area.

On Nov. 11, the staff of the bronchoscopic service was requested to see the patient because of impending asphyxia. An emergency bronchoscopy was performed at once, as the patient was having great difficulty breathing. An 8 mm. bronchoscope was passed into the trachea, and a large amount of soft tumor mass was encountered attached to the anterior wall and reaching from the lower end of the upper third of the wall into the lower third of the trachea. This mass almost filled the diameter of the trachea, leaving approximately 1/16 in. (0.1 cm.), around which the patient was breathing. The scope was passed beyond the tumor mass, and at once breathing became easy. The area of the trachea in the lower third, at which site a similar tumor was previously also found, seemed to be clear now, and there was no tumor around the left main stem bronchus.

It was decided to reopen the tracheotomy fistula with the bronchoscope in place. This operation was carried out by attending surgeons with the use of procaine hydrochloride anesthesia. The incision was made around the previous scar. A great deal of bleeding was encountered, and landmarks were pretty well enmeshed within the scar tissue. The trachea was palpated, and a long longitudinal incision was made through the second and third rings. A No. 6 tracheotomy tube was inserted and functioned very well.

The patient seemed to do well after operation and was started on x-ray therapy, receiving 900 r total dose.

Laboratory Data.—Blood sugar averaged 106 mg. per 100 cc.; the hemoglobin was 84% (13 gm. per 100 cc.), white blood cells 6,200 per cubic millimeter, red blood cells 4,340,000, stab forms 3%, segmented forms 70%, lymphocytes 22%, monocytes 1%, and eosinophiles 4%. Cholesterol averaged 412 mg. per 100 cc. of plasma, and the basal metabolism rate was —17% and —18%. Urine was cloudy and acid, with a specfic gravity of 1.002, albumin 1 +. There were 10 to 15 pus cells and a moderate amount of epithelial cells per cubic millimeter; Trichomonas was cultured.

X-Ray Examination.—Sella Turcica: The sella was considerably expanded, with the posterior clinoid processes somewhat thinner than usual, probably indicating pituitary pressure.

Chest: There was no evidence of pulmonary metastasis.

A marked turn for the worse began on Nov. 17, 1950, when she began to show edema of the neck without crepitation and increased dyspnea, even though nothing could be aspirated through the tracheotomy tube.

With the use of tetracaine (pontocaine®) hydrochloride anesthesia, the No. 6 tracheotomy tube was removed, and a 4 × 30 mm. bronchoscope was passed into the tracheotomy site. There was moderate edema of the tracheal wall, and much thick mucus was aspirated. Both main

stem bronchi were aspirated, the tracheotomy tube was replaced, and a plastic catheter was inserted to extend about 4 cm. beyond the tracheotomy tube. Her condition improved somewhat after this procedure.

On Nov. 21, 1950, portable chest x-ray revealed right lower lobe pneumonitis. The patient was now semicomatose and was running a spiking fever. The trachea was again aspirated by inserting a 4 mm. bronchoscope through the tracheotomy opening, and a large quantity of very thick secretion was removed.

The patient became comatose on Nov. 22, and continued on a downhill course, mucus rapidly accumulating and the patient becoming more and more dyspneic and cyanotic, in spite of aspiration and oxygen administration. She died on Nov. 24, apparently from asphyxiation.

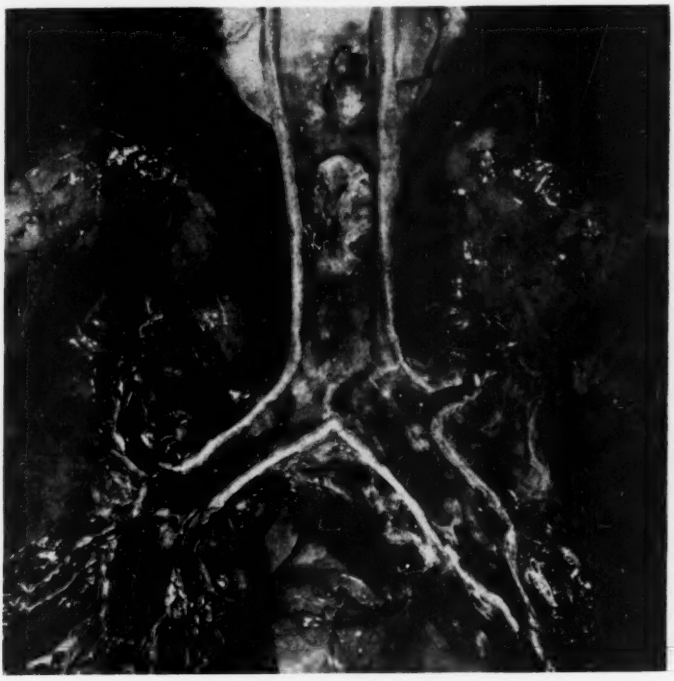

Fig. 1.—Demonstration of the anterior wall of the trachea with bifurcation. Above the latter the tumor is adherent to the anterior wall; above the tumor is the opening of the tracheotomy.

ABSTRACT OF AUTOPSY FINDINGS

The tongue, pharynx, larynx, trachea, heart, and lungs were removed en bloc. The trachea was then incised along its posterior wall. There was revealed in the midline of the anterior wall of the trachea, about 2.5 cm. proximal to the carina, a 2 by 2 by 1 cm. polypoid broad-based soft mass, whose central area had been grooved, probably by a tracheotomy tube. There was some purulent substance on its surface. This mass was firmly adherent to the tracheal wall (Fig. 1). On the cut surface of the mass, a rather fish-meaty appearance was seen, and it was attached to the wall of the trachea by a broad-based pedicle (Fig. 2 *A*). The trachea itself was very slightly thickened, the mucosa was smoky-red in color, and the bronchial

mucosa was similar. There was a marked amount of purulent exudate in the bronchi and the bronchioles. The bronchioles were markedly dilated towards the periphery. The left lung weighed 800 gm. and was subcrepitant in the upper lobe and noncrepitant, very firm, and heavy in the lower lobe. The cut surface revealed a spongy consistency of the upper lobe, but the lower lobe was somewhat granular and dark reddish-purple in color. On pressure, a purulent substance could be expressed from the smaller bronchioles. The right lung weighed 900 gm. The upper and middle lobes were subcrepitant. The lower lobe was noncrepitant, firm, and heavy. The cut surface of the lower lobe appeared granular and reddish-purple. The pleura was free of effusions and adhesions.

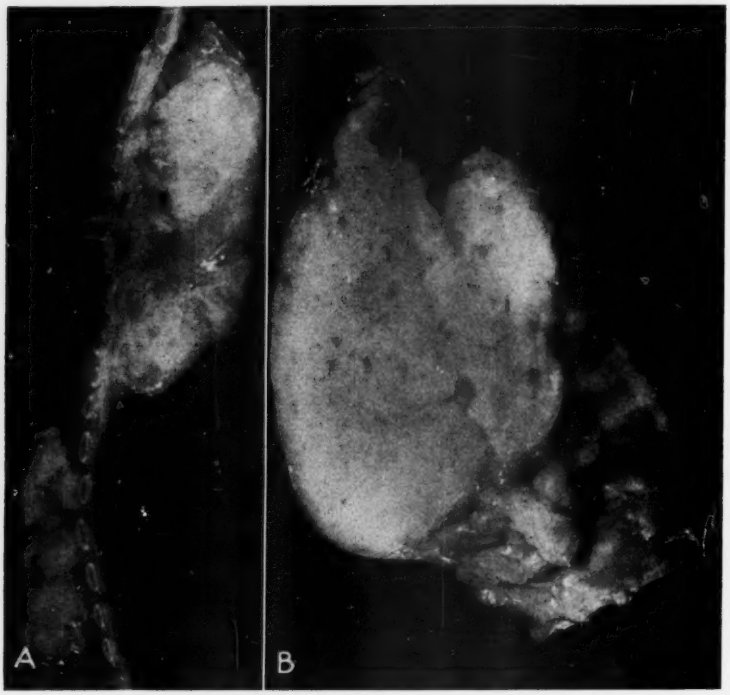

Fig. 2.—*A*, sagittal section of the tumor and intermediary lobe of the thyroid. *B*, right lobe of the thyroid presenting its close adherence to the surrounding and a white cut surface.

The thyroid gland had been previously sectioned at the isthmus. It was markedly enlarged and presented an intermediary lobe (Fig. 2 *A*). All lobes were extremely adherent to the trachea and the other adjacent formations and could not be separated from their surroundings. Their consistency was very hard, the cut surface was white and fish-meaty in appearance, and the usual pattern, including colloid, was absent. Both lateral lobes of the thyroid were markedly enlarged, firm, and adherent and offered a white cut surface (Fig. 2 *B*). There were no metastases.

Microscopic Findings.—The following stains were used: hematoxylin and eosin, trichrome, azocarmine, elastic stains, Papanicolaou, Shorr, silver, iron hematoxylin,

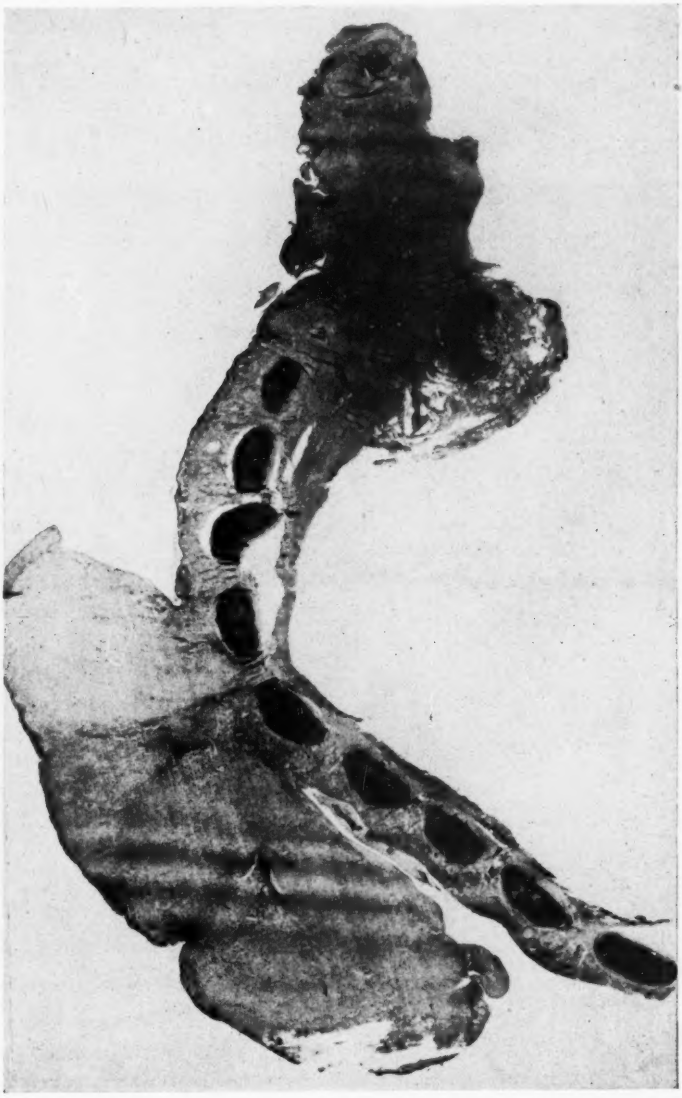

Fig. 3.—Microscopic section of the tumor and intermediary lobe of the thyroid under low power (× 2; hematoxylin and eosin stain). Early infiltration of the tumor between two rings.

and stains for mucus, glycogen, and fat. We shall not describe the pictures under different stains but rather results of observations made with all these stains together.

Tumor of Trachea: Between the posterior aspect of the isthmus of the thyroid and the trachea, evidence of chronic inflammatory reaction (perithyroiditis) was seen.

The glands of the trachea were normal and gave a positive mucoid reaction. The surface epithelium of the trachea from the isthmus down to the tumor showed nowhere evidence of clear-cut ciliated epithelium. Remnants of the latter were

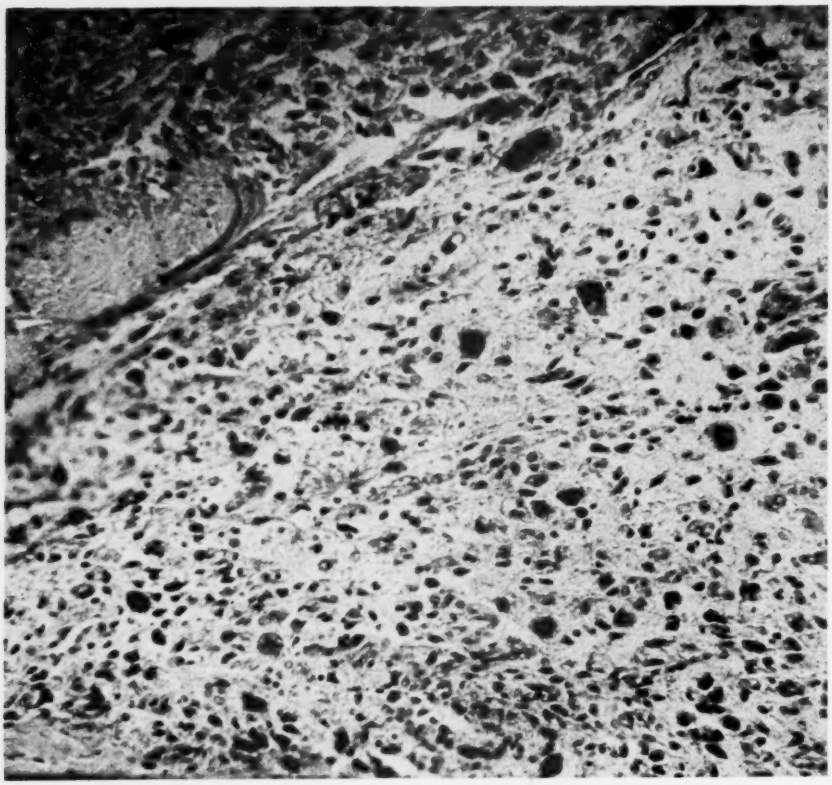

Fig. 4.—Microscopic section of the tumor (× 180; trichrome stain) showing tumor very rich in cells, carrying numerous giant cells and blood vessels.

seen, but for the most part the ciliated epithelium had been transformed into transitional- or squamous-cell epithelium. However, nowhere was any keratinization noticed. The entrances into the glands participated in this metaplasia. There was some evidence, apart from this metaplasia, of oversecretion in the mucoserous glands, as well as chronic inflammatory reaction, which involved also the perichondrium of the cartilages of the ring (Fig. 3).

Serial sections taken between the isthmus and the insertion of the tumor did not give any evidence of tumor infiltration.

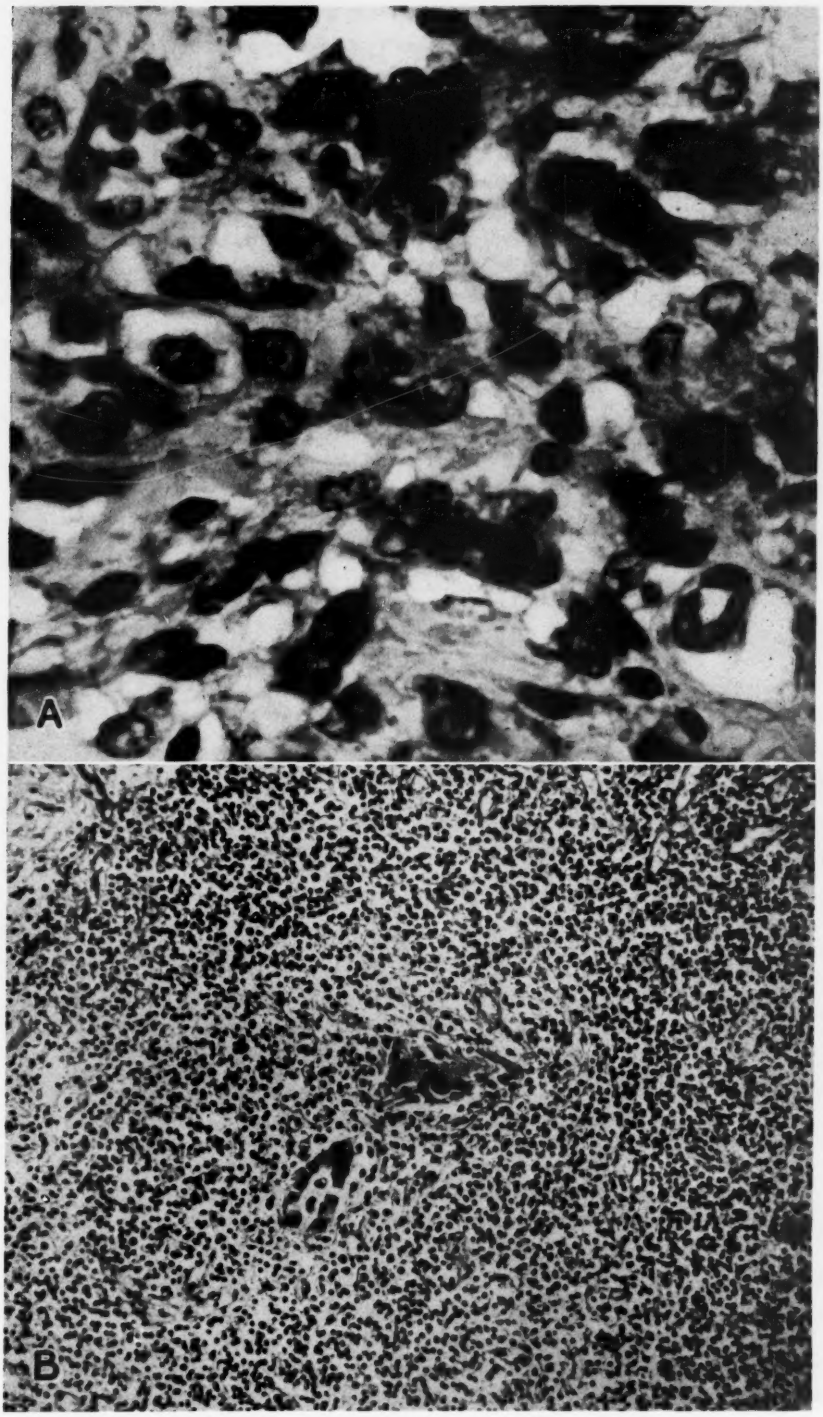

Fig. 5.—*A*, microscopic section of the tumor (× 898; iron hematoxylin stain). Typical tumor cells with large nuclei and nucleoli, giant cells, bizarre forms. *B*, microscopic section of the lateral lobe of the thyroid inflammatory focus (× 180; iron hematoxylin stain). Center shows remnants of glands and fusing nuclei to form giant cells (Riedel struma).

The surface of the tumor was covered to a large extent by metaplastic squamous epithelium, instead of the usual ciliated epithelium. The dome of the tumor showed an area where the epithelium was lacking and was substituted by fibrin and necrotic material. Whether this was a spontaneous ulceration or whether it was the remnant of previous biopsy is hard to say. Most probably it was a spontaneous ulceration, as the defect was only very superficial. Just below the epithelium, there was a large amount of vessels, of the arterial type as well as of the venous type. They were engorged heavily with blood. Some of this blood showed extravasation into the

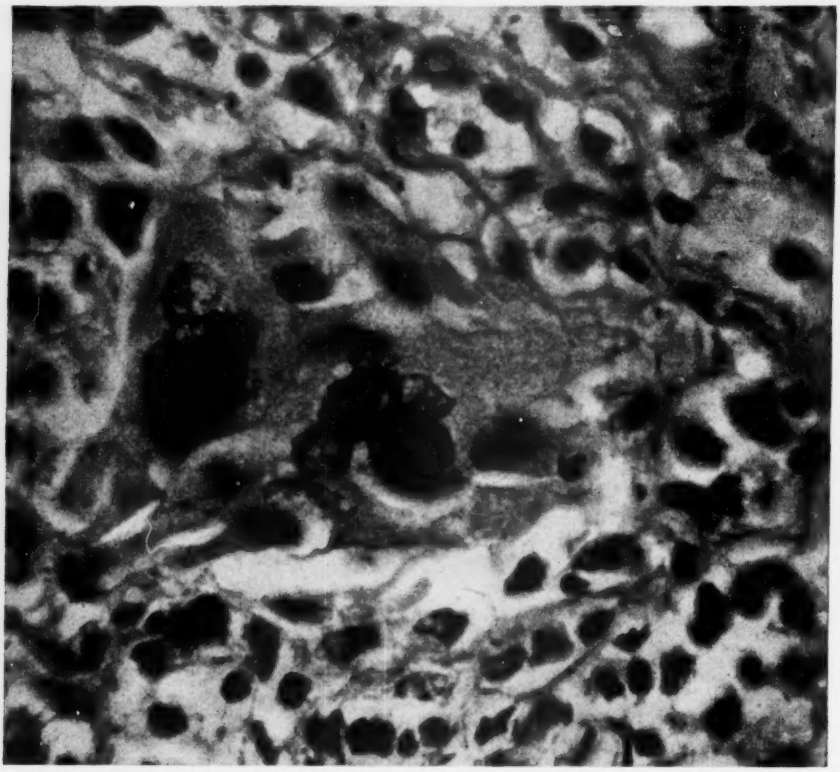

Fig. 6.—Microscopic section of the lateral lobe of the thyroid (× 570; trichrome stain). Riedel struma.

necrotic area. The basic matter of the tumor itself carried a large amount of argentophilic fibers, arranged in a straight manner or surrounding single cells. The thicker ones among them were more purplish-black in color, while the thinner ones were black. Special stains also revealed a very moderate framework of connective tissue, assuming a blue color with azocarmine stain and a green color with trichrome stain. The tumor itself was composed of different cell types (Fig. 4). First, large ovoid or round-shaped cells were seen which carried one or two acidophilic large nuclei, heavy or delicate chromatin network, and a distinct nuclear membrane. The cytoplasm was either small or large and often had a bizarre outline. In some areas, it

was basophilic, and in others, acidophilic. Cell formations, probably the result of fusion of different cells, were then seen. Their nuclei were merged and assumed a bizarre form. Besides, there were huge giant cells in which atypical mitoses, pyknosis, and rhexis could be seen (Fig. 5 *A*). In none of these large bizarre cells were we able to find longitudinal fibers, striations, glycogens, or lipids. All these elements were scattered diffusely throughout the tumor, which was very rich in cells. In one extended area, the tumor was seen to penetrate between two tracheal rings and to invade the outer layers of the trachea.

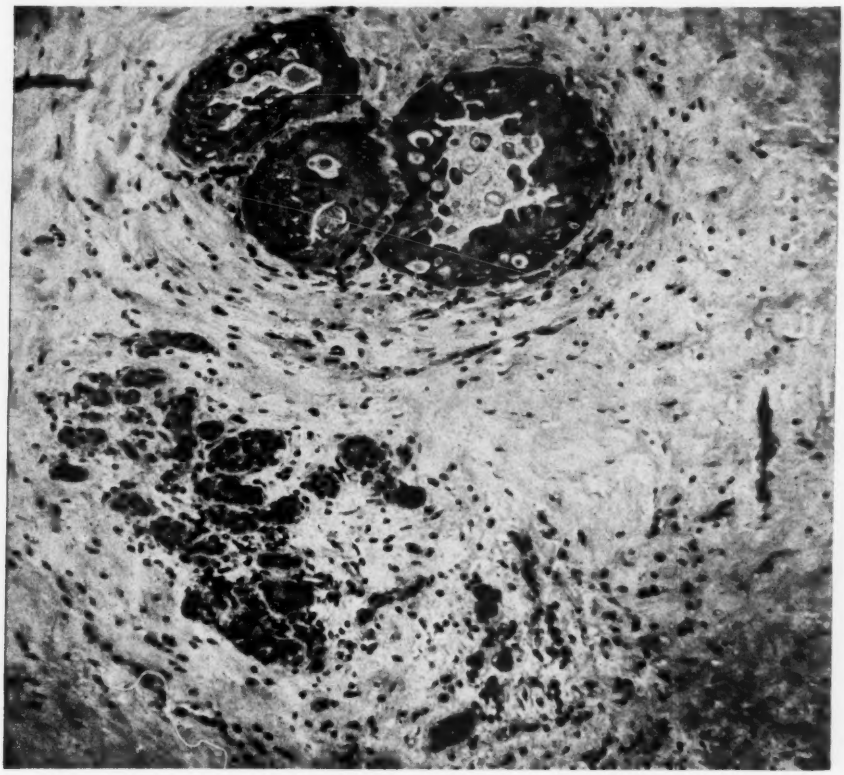

Fig. 7.—Microscopic section of the lateral lobe of the thyroid (× 180; trichrome stain). Glands with metaplasia embedded into increased, partly hyalinized connective tissue (Riedel struma).

Lungs: The lungs examined in different areas showed numerous regions where the alveolar sacs were filled with red blood corpuscles, lymphocytes, and pus cells. The vessels were engorged, and a moderate amount of coal pigment was present. The main bronchi showed evidence of squamous-cell metaplasia, which was sometimes also seen in the bronchioles as far as above the infundibula.

Thyroid: The most outstanding feature of the thyroid (Fig. 2), and this applies to all lobes, the lateral as well as the isthmus, was a practically complete substitution of thyroid tissue by connective tissue (scar tissue). This connective tissue was

extremely poor in cells and showed a moderate amount of collagenous fibers and hyalinization. It carried only a very moderate amount of blood vessels, most of which showed a thickened wall. Scattered throughout the tissue there were foci of inflammatory reaction, composed mainly of lymphocytes, plasma cells, and large mononuclears. Within the center of this focal reaction, remnants of epithelial cells were seen, some of them still in connection with each other, representing remnants of glands (Fig. 5 *B*). Here the nuclei were rather heavy and large, sometimes with evidence of rhexis and pyknosis; the cytoplasm was very acidophilic. In other

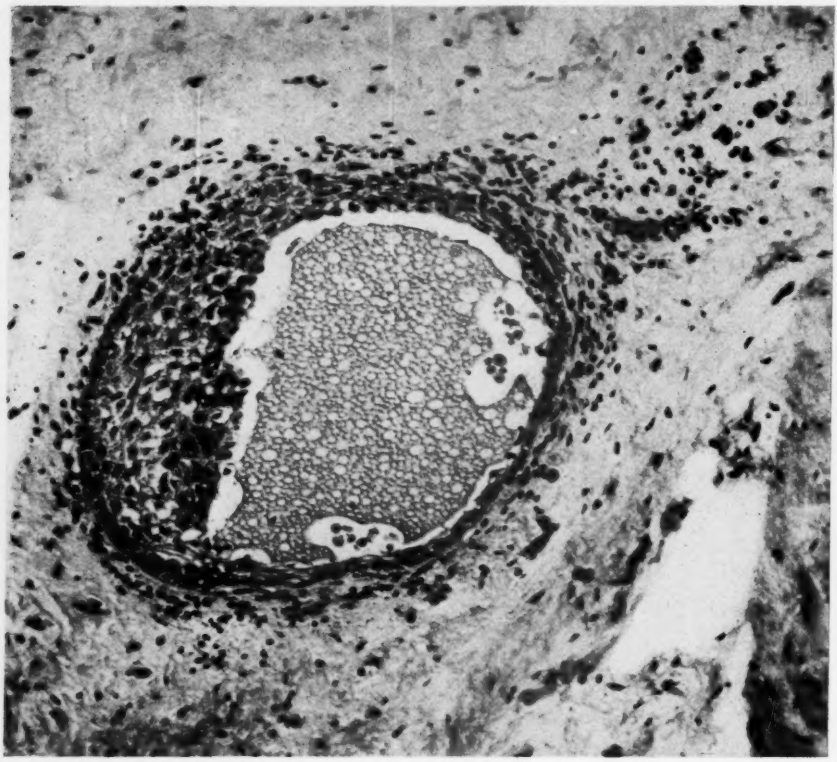

Fig. 8.—Microscopic section of the lateral lobe of the thyroid (× 180; trichrome stain). Cyst-like formation, metaplasia.

instances, formation of giant cells could be seen (Fig. 6). Besides, there were also larger, and smaller, cysts outlined by an epithelium which was transitional in character, with some metaplastic changes. In some of these cysts, the cuboidal epithelium was still present but was gradually replaced by a low layer of squamous epithelium. These cysts were often surrounded by inflammation of the same character as described previously (Figs. 7 and 8). But epithelial remnants were not seen in all of the inflammatory foci, either because they were not in the plane of the section or because they had already been eliminated by regeneration. There were also areas

with remnants of glandular formation, empty in their lumen, simply lodged in the connective tissue without any evidence of reaction. Sometimes giant cells were noticed outside the inflammatory foci.

The squamous metaplasia observed in larger cysts was more evident in smaller ones, but always without keratinization. Finally, solid plugs of metaplastic squamous cells, probably due to tangential sections of cysts, were found. There were waves of elastic fibers running parallel to each other; sometimes a cross section of these fibers was seen surrounding organized tissue, most probably the remnants of an organized thrombus. The arteries showed an increase and splitting of their elastic fibers. In some instances, it was noted that the epithelium of the trachea attached to this thyroid tissue also showed signs of metaplasia whereby the high columnar ciliated epithelium was transformed into typical squamous epithelium.

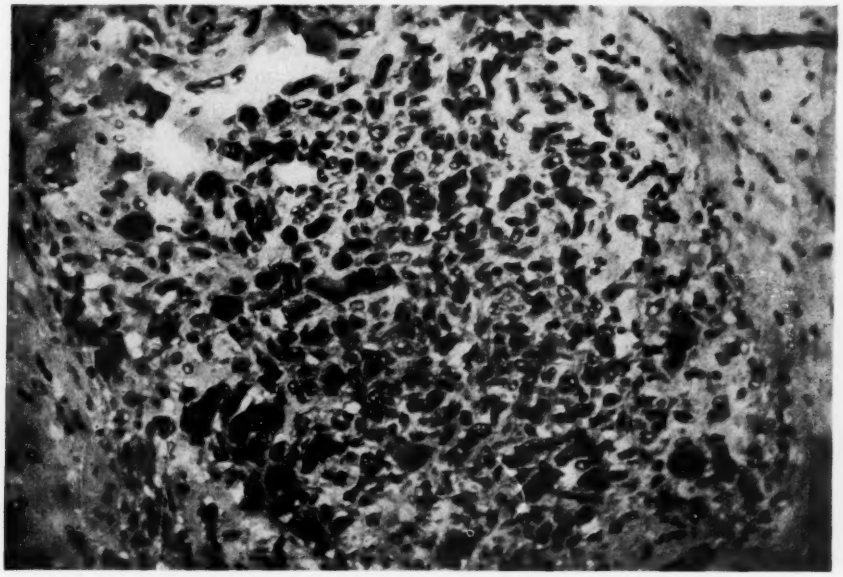

Fig. 9.—Microscopic section of the intermediary lobe of the thyroid (× 360; trichrome stain). Focus partly inflammatory elements, partly tumor-like cells with large nuclei, giant cell formations, and bizarre cell formations resembling the pattern of the primary tumor.

Sections taken through the isthmus, especially in the middle portion of the isthmus, showed very peculiar changes composed of areas which contained not only the inflammatory elements seen in other instances but also very large cells carrying heavy nuclei, one or more, with very bizarre forms. The cytoplasm of these cells was very limited in amount. It is hard to say whether remnants of giant cells which were breaking up were being dealt with or whether this was true tumor tissue from the primary tumor of the trachea. Serial sections taken between the isthmus and the insertion of the tumor did not give any evidence whatsoever of tumor infiltration (Fig. 9).

Sections taken from the periphery of the thyroid tissue showed close adherence with skeleton muscle fibers. Most of these muscle fibers lacked striation; in others, the striation was still preserved.

Diagnosis (Gross and Microscopic).—The diagnosis included the following: primary sarcoma of the anterior wall of the trachea (myosarcoma); Riedel struma; bronchopneumonia; bronchitis, bronchiolitis, peribronchitis (marked squamous-cell metaplasia of the mucous membranes of the trachea, bronchi, etc.); hypertrophy and dilatation of both ventricles of the heart; fatty infiltration of the liver; cholelithiasis and chronic cholecystitis, and chronic cystitis.

COMMENT

The description of the pattern and the pictures of this tracheal tumor leaves no doubt that a malignant neoplasm is being dealt with which is not epithelial but mesenchymatous in character. Though it is common knowledge that tumors of this type do not fit into the group of simple sarcomas, such as round-cell or spindle-cell sarcomas, respectively, it is to the credit of A. P. Stout that he requested that every one of these tumors be analyzed with the help of special staining methods (azocarmine, silver impregnation, etc.) before designating them as simple mixed-cell sarcoma, as one could have been tempted to do in our case.

In 1946, Stout [1] suggested a rather simple nomenclature for this tumor group, and, in 1948,[2] he analyzed the different patterns of true fibrosarcomas. According to him, the latter can be subdivided into two main groups, namely, the well-differentiated type and the poorly differentiated type. In the first case, the tumor cells have rather uniform and hardly hyperchromatic nuclei. Well-developed collagen and reticulum fibers and, most important of all, relatively few or no mitoses are encountered. In the poorly differentiated type, the tumors are very rich in cells, with only scattered collagen and delicate reticulum fibers, marked polychromasia, pleomorphism, and numerous mitoses. The appearance and distribution of argentophilic fibers in fibrosarcoma is, according to Stout, also one of the most important aspects for differentiation of this type of tumor from others. Fibroblasts, composing a fibrosarcoma, produce connective tissue which may be collagenous in type and appears thick after silver impregnation, or they are slender and are then referred to as reticulum fibers. If such a fibrosarcoma is well differentiated, then these argentophilic fibers form long wiry straight stands of reticulum. We shall further add that in cases of fibrosarcoma the cells are spindle-shaped and the nuclei adapt their form more or less to the shape of the cells.

There are some case reports, such as those of Norsk,[3] Richards and Dietrich,[4] Watson-Williams,[5] and Weinberg,[6] which treat of a tracheal involvement by fibrosarcoma. We agree with Stout [2] that a careful histological revision of all these cases may bring forth the fact that not all of them could meet the diagnostic requirements postulated by him.

If we now compare these descriptions of different types of fibrosarcomas with the tumor in our case, we see that none of them applies to it. Therefore, we feel safe in stating that this tumor is not a fibrosarcoma.

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1. Stout, A. P.: Rhabdomyosarcoma of Skeletal Muscles, Ann. Surg. **123**:447, 1946.
2. Stout, A. P.: Fibrosarcoma: Malignant Tumor of Fibroblasts, Cancer **1**:30, 1948.
3. Norsk, F.: Tilfaelde af sarcoma trachea: Roentgenbehandling, Recidivfri, i 3, Gar. Hospitalstid 77, Zentralbl. Hals- Nasen- u. Ohrenh. **24**:307, 1935.
4. Richards, L. G., and Dietrich, H. F.: Fibrosarcoma of Trachea, Ann. Otol. Rhin. & Laryng. **43**:892, 1934.
5. Watson-Williams, E.: Sarcoma of the Trachea, J. Laryng. & Otol. **46**:846, 1931.
6. Weinberg, T.: Sarcoma of Trachea: Report of 2 Cases, Am. J. Cancer **37**:201, 1939.

Other types of tumors, also carefully investigated by Stout and often mistaken for fibrosarcoma, are the group of myosarcomas and liposarcomas, respectively. Stout [1] suggests a simplified nomenclature of muscle tumors. He differentiates between two main groups, the smooth muscle cell tumors (leiomyoma and leiomyosarcoma) and the striated muscle cell tumors (benign and malignant granular-cell myoblastoma, rhabdomyoma of the heart, nearly always histologically benign, and rhabdomyosarcoma, potentially or definitely malignant) and undifferentiated myosarcoma, a term applied to tumors that cannot be placed in either of these groups.

Stout [2] discusses in his paper only those tumors which have some of the characteristics of rhabdomyoblasts and which have arisen from striated muscles. He gives a very vivid description of the variability in size and shape of the nuclei of these cells and describes the cytoplasm as being more or less acidophilic, granular, and showing cross striation, longitudinal myofibrils, or the tendency to form these structures in most of the cases. He also points out that it is sometimes impossible to find these structures or that they are found only after painstaking search, as he puts it, with the use of high magnification. In other words, the absence of cross striation or longitudinal fibrils alone does not exclude the presence of rhabdomyosarcoma or leiomyosarcoma. This statement is also borne out by a case report published recently from this department by John Snyder, R. L. Evans, and C. B. Clay.[7] In a case of myosarcoma of the uterus, striated cells in iron hematoxylin preparations could only be found after weeks of extremely careful search. Pogogeff and Murray [8] emphasize the variability and inconsistency of cross striation and longitudinal myofibrils in tissue cultures. It is, therefore, very understandable that rhabdomyosarcomas are often misdiagnosed as liposarcomas and fibrosarcomas. Rhabdomyosarcomas, as well as liposarcomas, often show cells of very bizarre forms. The cells of both of these tumors show vacuoles, but, while the liposarcoma cells contain lipoid droplets, the cells of the rhabdomyosarcoma are supposed to contain glycogen in the vacuoles (Marchand, 1885 [9]). We were unable to find lipoid droplets in our case, but neither could we see glycogen droplets. While the absence of lipoid was conclusive, as proper fixation and technique (formalin, Sudan, Nile blue) had been used, the absence of glycogen could not disprove its previous presence, as adequate fixation (absolute alcohol or Carnoy's fluid) had not been applied. In our histological description of the tumor, we emphasized the abundance of huge bizarre cell forms and neoplastic giant cells. We found but little collagen, delicate reticulum fibers outside the cells, and evidence of a fast-growing tumor extremely rich in blood vessels, all signs against the assumption of fibrosarcoma. If we finally quote Stout,[2] "in my experience, bizarre giant cells either with a single or with multiple nuclei are exceedingly uncommon—if they appear in considerable numbers the tumor generally proves to be not a fibrosarcoma but likely either a liposarcoma, rhabdomyosarcoma, or leiomyosarcoma," we feel all the more justified to call the tumor in our case a myosarcoma.

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7. Clay, C. B.; Evans, R. L., and Synder, J. W.: Rhabdomyosarcoma and Adenocarcinoma in the Same Uterus, Am. J. Surg. **83**:600, 1952.

8. Pogogeff, I. A., and Murray, M. R.: Regeneration of Adult Mammalian Skeletal Muscle in Vitro, Science **101**:174, 1945.

9. Marchand, F.: Ueber eine Geschwulst aus quergestreiften Muskelfasern mit ungewöhnlichem Gehalt an Glykogen, nebst Bemerkungen über das Glykogen in einigen fötalen Geweben, Arch. Path. Anat. **100**:42, 1885.

The location of this tracheal tumor, as described before and demonstrated in the pictures, leaves no doubt that the tumor originated from the anterior wall of the trachea, that it grew into the lumen, and that it was not the result of secondary invasion. If one follows Jackson's [10] classification of tracheal tumors from a mechanical point of view, one has to differentiate between an endotracheal and a peritracheal type. The first may lead, according to this author, to a valvular partial obstruction, as in our case, and is then of the bypass type, in which air can pass in both directions but in diminished quantity.

Now the question arises as to how a myosarcoma of the trachea in this particular location can be explained histogenetically. The trachea consists of a framework of about 16 to 20 cartilage crescents which are connected by rather heavy connective tissue (ligamenta annularia) lined on the inside by a tunica mucosa. At the posterior wall there is not cartilage, and situated between the external fibrous tunic and the mucosa are bundles of smooth muscle which connect the cartilages. The tumor in this discussion was located on the anterior wall above the carina, but its lower pole was only three rings from it. The tumor itself extended over three to four rings, and there were three rings left between the upper pole and the isthmus lobe of the thyroid which formed part of the Riedel struma. According to Miller,[11] the tracheal cartilage may split and may fuse with adjoining cartilages. They may also bifurcate and have irregular openings. The well-known irregularity of the carina is of no importance for our case. With reference to the muscle tissue, Miller [11] quotes Cavier, who noted for the first time that in some animals smooth muscle bundles are inserted on the outer surface of the cartilages, while in other animals they are on the inner surface. In carnivores, the attachment is external; in monotremes and in insectivores it is internal. In animals with vegetable diet, the attachment is usually internal, but in the rabbit, it is external. In men who live on a mixed diet, the attachment is internal. The muscle fibers are represented by branching and anastomosing bands which extend between the cartilages. "Whatever the position of the muscle, be it external or internal, it is not inserted into the extreme tip of the cartilage but into the perichondrium, some distance from the extremity of the cartilage" (Miller [11]). According to the same author, longitudinal bands are extremely rare. Verson [12] and Frankenhauser [13] described scattered bands of smooth muscle ending in the connective tissue between the cartilages, a finding, however, not confirmed by Miller. In the adult, the bands of muscle connected with a given cartilage maintain their independence to a great extent, while in the newborn child, they form a more complex network. Abnormal persistence of this complex network or the presence of scattered bands, as described by Verson [12] and Frankenhauser,[13] could explain the unusual location of the tumor in our case.

Kahler,[14] in 1908, describing a myxosarcoma of the trachea also traced it to "displaced muscular bands" from the posterior wall. Richards and Dietrich [4] are

10. Jackson, C.: Tumors of Trachea, South. Surgeon **5**:263, 1936.

11. Miller, W. S.: The Lung, Springfield, Ill., Charles C Thomas, Publisher, 1947.

12. Verson, E.: Beitraege zur Kenntnis des Kehlkopfes und der Trachea, Sitzungsber. d. k. Akad. d. Wissensch. Math. Naturw. Wien, Vol. 57, Abhlg 1 1868; Kehlkopf und Trachea und Strickers, Hdb. d. Lehre v. d. Geweben d. Menschen, 1871.

13. Frankenhauser, K.: Cited by Hart, A., and Mayer, E., 1879.

14. Kahler, O.: Zur Kenntnis der Trachealsarkom, Wien. Med. Wchnschr. **58**:906, 1908.

of the same opinion. This possible explanation of the location, together with the application of Stout's criteria to this tumor, justifies us in assuming it to be a myosarcoma.

As previously mentioned, the presence of this tumor was associated with changes of the thyroid gland, which are considered to offer the picture of a Riedel struma. It is not our intention to give a survey of the literature of Riedel struma, but we shall only refer to the work of the DeCourcys [15] and many others. The gross

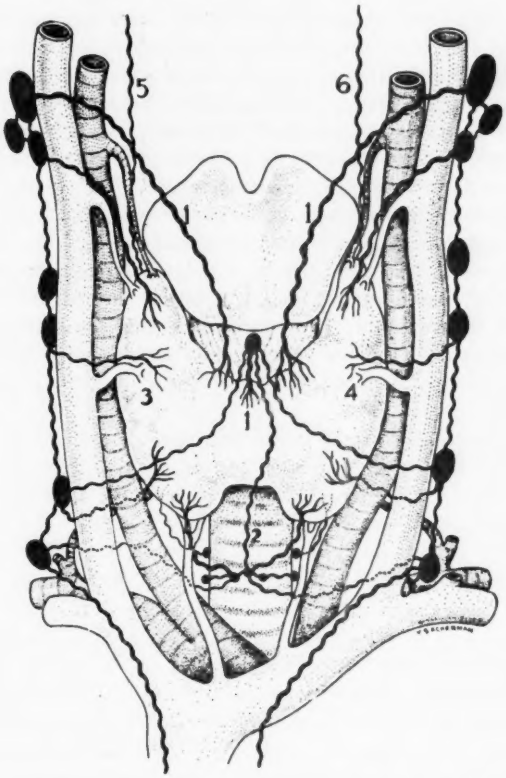

Fig. 10.—Schematic representation of the lymphatic trunks draining the thyroid gland: *1*, the median superior trunk; *2*, the median inferior trunk; *3* and *4*, the right and left lateral trunks; *5* and *6*, the posterosuperior trunks. All of these are drained by the lymph nodes of the internal jugular chain and recurrent chain and by the pretracheal and retropharyngeal lymph nodes. Courtesy of Ackerman and del Regato.[16]

appearance in our case, such as white color, enlargement, extreme density, and marked fibrosis, meets all the requirements postulated by these authors. The same agreement applies to our microscopic findings of almost complete disappearance of epithelium, remnants of the latter in the form of isolated glands, cells, giant cells,

15. DeCourcy, J. L.: New Theory Concerning Etiology of Riedel's Struma, Surgery **12**:754, 1942. DeCourcy, J., and DeCourcy, C.: Pathology and Surgery of Thyroid Disease, Springfield, Ill., Charles C Thomas, Publisher, 1949.

inside and outside inflammatory foci, small cysts with and without squamous-cell metaplasia, etc. Our findings with regard to still persisting inflammatory reaction at the tracheal attachment of the gland carry some weight in accepting the DeCourcys' theory of the important role of perithyroiditis in the pathogenesis of Riedel struma.

When studying the isthmus lobe, we found exactly the same changes as in the main lobes, but, apart from that, we found an accumulation of inflammatory elements (fibroblasts, mononuclears, and lymphocytes) plus giant cells which presented such advanced damage (rhexis and pyknosis) that we were unable to determine whether we were dealing with severely altered blastomatous giant cells or with injured giant cells of the Riedel struma type. Though we assume the presence of the latter, the question has to be considered whether a tumor spread into the isthmus would be possible or not. Ackerman and del Regato [16] discuss the lymphatic trunks draining the thyroid gland (Fig. 10). They quote Rouvière, who differentiates among six main groups of trunks. Among them, only the one designated as *2* in the picture is of importance for our problem. It is referred to as the median inferior trunk, which drains into the lymph nodes of the transverse pretracheal chain. In our serial sections of the trachea between isthmus and tumor, it could be shown that tumor cells were not present in this lymph trunk. This finding, naturally, does not exclude their presence in the isthmus, but then one would have to assume a retrograde invasion for some reason or the other. Be this as it may, we still prefer to assume that the focus in the isthmus is of inflammatory and not of neoplastic pattern. It is evident from our serial sections that this focus in the isthmus is, by no means, the primary tumor.

Instead of an extensive survey of the literature on tumors of the trachea, we should like to refer the reader to survey papers, such as those of C. Hart and E. Meyer [17] (1928), R. D'Aunoy and A. Zoeller [18] (1931), Tobias Weinberg [6] (1939), Schiffner (1945), Louis Faber [19] (1945), Gilbert E. Fisher [20] (1947), and P. H. Holinger, Frank J. Novak, and Kenneth C. Johnston [21] (1950).

All these authors enumerate all cases known up to the dates of their publications, and all of them emphasize that sarcomas of the trachea are extremely rare; that they grow very slowly; that practically all of them originate from the posterior or the lateral wall; that they are pedunculated or sessile, rather soft, and ovoid or round; that they incline to hemorrhage; that there are no differences in their occurrences among sexes, and that they are more frequently seen in the second decade of life (though Richards, Lyman, and Dietrich describe one tumor in an 8-month-old infant). We shall go into detail only in discussing those cases in the literature in which the lesions were diagnosed as myosarcomas or can be interpreted as such.

Louis Fabre,[19] in his paper on sarcomas of the trachea, describes a case involving a 60-year-old man who had been hoarse for several months and who complained of

16. Ackerman, L. V., and del Regato, J. A.: Cancer: Diagnosis, Treatment, and Prognosis, St. Louis, C. V. Mosby Company, 1947.

17. Hart, C., and Mayer, E., in Henke, F., and Lubarsch, O.: Handbuch der speziellen pathologischen Anatomie und Histologie, Berlin, Springer-Verlag, 1928, Vol. 3, Pt. 1, p. 465.

18. D'Aunoy, R., and Zoeller, A.: Primary Tumors of Trachea, Arch. Path. **11**:589, 1931.

19. Fabre, L.: Les sarcomes de la trachée, Ann. oto-laryng. **12**:477, 1945.

20. Fisher, G. E.: Primary Neoplasms of Trachea, South. Surgeon **13**:78, 1947.

21. Holinger, P. H.; Novak, F. J., and Johnston, K. C.: Tumors of the Trachea, Laryngoscope **60**:1086, 1950.

increase of his hoarseness, moderate hemoptysis, and dyspnea during the last three months before admission. Examination revealed a lobulated tumor below the vocal cords, occupying three-fourths of the anterior lumen of the trachea. It was covered with normal mucosa and was attached to the anterior wall of the trachea by a broad pedicle. The microscopic examination of the biopsy specimen revealed a very active and rather wild-growing proliferation of histiocytic elements, numerous mitoses and amitoses, and a large amount of giant cells. Diagnosis of malignant histiocytoma was made, and the patient was subjected to x-ray treatment, with good results. This case is the only one we could find in the literature in which the lesion shares the location with the tumor in our case. The similarity between the microscopic picture in this case and ours makes us believe that this tumor was a myosarcoma.

In their investigation of tumors of the trachea, Hollinger, Novak, and Johnston [21] studied 28 tumors during 14 years. They differentiate between inflammatory tumors and true neoplasms, and of the 28 tumors 18 were located primarily in the trachea, while 10 invaded it from the outside. Among the true neoplasms, five were benign and nine malignant; five of the latter were squamous-cell carcinomas, one was an adenocarcinoma, one was a cylindroma, and two were myosarcomas, previously described by these authors, though one of them at that time had been regarded as a fibrosarcoma. There is no report of a combination of such a tumor with Riedel struma in the entire literature.

We felt that we should report this case on account of the rare occurrence of this type of tumor, its unusual location, and its peculiar combination with a Riedel struma.

SARCOMA OF LARYNX

Report of Two Cases

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SARCOMA of the larynx is rare. There have been comparatively few cases reported in the literature. Tucker [1] in 1935 found one in 200 consecutive cases of laryngeal cancer; Figi [2] found four cases from the Mayo Clinic over a period of 23 years, from 1910 to 1933, while in 1941 Havens and Parkhill [3] reported 11, including four cases which were previously reported by Figi. They [3] also noted 15 additional cases which they stated were collected from "pertinent literature in English covering the same period from 1910 to 1941."

The early German literature seems to stress the rarity of sarcoma of the larynx, and Kahler [4] reported in 1927 a total of 183 cases up to that time. The statistics in the American literature confirm the observations of the German writers. Clerf,[5] as recently as 1946, maintained that the ratio of one case of sarcoma of the larynx to approximately 100 cases of carcinoma was the average. In his [5] case reports, he mentions eight cases of sarcoma and 740 cases of carcinoma of the larynx. Numerous other men have reported one and two cases, among whom are Baldenweck and Leroux-Robert,[6] Gonzales Loza,[7] Rigby and Holinger,[8] Foster,[9] and Ferguson.[10] With the fact in mind that this particular type of case is rare, two cases are presented in order to add to those already reported.

In the first of our cases, as Clerf [5] pointed out in 1946, my colleagues and I were misguided by the benign clinical appearance of the tumor mass. It was lobulated and, upon biopsy, was reported by the pathologist as fibroma. Because of the size

1. Tucker, G.: Cancer of Larynx: Observations in 200 Consecutive Cases, Arch. Otolaryng. **21**:1 (Jan.) 1935.

2. Figi, F. A.: Sarcoma of Larynx, Arch. Otolaryng. **18**:21 (July) 1933.

3. Havens, F. Z., and Parkhill, E. M.: Tumors of Larynx Other Than Squamous Cell Epithelioma, Arch. Otolaryng. **34**:1113 (Dec.) 1941.

4. Denker, A., and Kahler, O.: Handbuch der Hals-Nasen-Ohrenheilkunde: Mit Einschluss der Grenzgebeite, Berlin, Springer-Verlag, 1927.

5. Clerf, L. H.: Sarcoma of Larynx: Report of 8 Cases, Arch. Otolaryng. **44**:517 (Nov.) 1946.

6. Baldenweck, L., and Leroux-Robert, J.: Case of Reticulosarcoma of Larynx, Ann. otolaryng., April-June, 1942, p. 94.

7. Gonzales Loza, M.; Imhoff, D., and Fernandez Rodriguez, A. D.: Primary Sarcoma of Larynx: Endoscopic Extirpation, Rev. otorrinolaring. **2**:458 (Dec.) 1943.

8. Rigby, R. G., and Holinger, P. H.: Fibrosarcoma of Larynx in Infant, Arch. Otolaryng. **37**:425 (March) 1943.

9. Foster, J. H.: Fibrosarcoma of Larynx, Ann. Otol. Rhin. & Laryng. **53**:764 (Dec.) 1944.

10. Ferguson, G. B.: Sarcoma of Larynx, Arch. Otolaryng. **38**:265 (Sept.) 1943.

of the tumor, it was decided to do a laryngofissure, and the tumor mass, as well as a portion of the cord, was removed. However, the pathological report was sarcoma. Inasmuch as we felt that we had removed the entire tumor mass, we decided to watch the patient, but in approximately two months she returned, with a severe laryngeal obstruction, which necessitated an emergency tracheotomy. It was then decided to do a total laryngectomy.

The clinical appearance of the tumor in our second case was much the same as that in the first. However, with the experience of our first case in mind, we were convinced that this was a malignant tumor, and three attempts at biopsy were made until a definite positive report of sarcoma was returned by the pathological laboratory. This experience only tends to emphasize, as Clerf [6] indicated in 1946, that sarcoma may not only have a benign clinical appearance but, even on biopsy, may have a histologically benign appearance. Clerf [5] also pointed out that the reason for this is the fact that sarcomatous tumors seem to have a peripheral area of benign tissue.

Lachmann [11] and Ferguson [10] in their cases performed thyrotomies, with local excision of the tumor mass along with portions or all of the vocal cords. They [12] felt that, in view of the encapsulation and late metastatic extension, this was an adequate surgical procedure. Clerf [5] in his cases combined thyrotomy and local excision with total laryngectomy in two cases. In our first case, although we removed the entire tumor mass by means of laryngofissure, it recurred quickly. In the second case, two-thirds involvement of one vocal cord combined with partial involvement of the opposite cord indicated to us more extensive surgery than thyrotomy. In both of our cases, we felt that it was more conservative as a lifesaving measure to do a complete laryngectomy than to attempt local excision of the tumor itself.

REPORT OF CASES

CASE 1.—E. M. was admitted on March 13, 1951, with the chief complaint of hoarseness for about eight months.

History.—The patient complained that approximately eight months prior to her first visit to our office she noticed that she was beginning to become hoarse. She had no difficulty in breathing, pain, or other symptoms. In the few weeks prior to admission, the hoarseness seemed to have been getting worse. She had no cough, chest pain, weight loss, anorexia, or eating difficutly.

She had been in good health. There was no history of childhood diseases, rheumatic fever, tuberculosis, allergy, or diabetes. She had had no surgery. She had one sister, living and well.

Physical Examination.—The patient was a well-nourished 62-year-old single white woman, lying quietly in bed without any respiratory difficulty. Temperature, pulse, and respiration were normal. Blood pressure was 140/80.

The eyes were normal, the skin was clear, and the lymph nodes showed no enlargement. The condition of the ears, nose, and throat was within normal limits. The neck was normal, with no lymph node enlargement. In the larynx, a moderate-sized tumor seemed to arise from the right vocal cord and filled about three-fourths of the laryngeal opening. In respiring, the patient breathed around this, causing it to move up and down. The tumor mass itself appeared by direct examination to be approximately 1 to 2 cm. in diameter. The chest was moderately obese; the breath sounds, of good quality. The heart was within normal limits, and no murmurs were heard. Examination of the extremities showed no abnormalities, and the neurological findings were normal. The impression was that of tumor of the larynx.

11. Lachmann, J.: Sarcoma of Larynx, A. M. A. Arch. Otolaryng. **53**:299, 1951.
12. Lachmann.[11] Ferguson.[10]

Progress Notes.—On March 13, 1951, direct laryngoscopy was done and a biopsy specimen taken. The tumor was seen to be approximately 1 to 2 cm. in diameter, extending from the anterior commissure of the left cord. The patient was discharged from the hospital after a report of benign fibroma. Since the biopsy specimen was reported as fibroma, it was felt that because of the size of the tumor mass it would be extremely difficult to remove it from within the larynx, and arrangements were made for a laryngofissure.

On April 5, 1951, a thyrotomy was done, and a tumor approximately 2 cm. in diameter was removed from the left cord. This extended over almost the entire aspect of the left cord. Tracheotomy was performed at operation and the tracheotomy tube removed on April 6, 1951. The patient made an uneventful recovery and was discharged from the hospital on April 10, 1951.

On April 13, 1951, the pathological laboratory reported a diagnosis of fibrosarcoma, which appeared to be localized within the tumor mass. Consultation with the pathologists seemed to reveal the fact that because the tumor mass had been removed, it would be better to observe the patient, with the possibility of removal of the entire mass, and she was followed at weekly intervals.

On June 4, 1951, approximately two months after her discharge from the hospital and about two weeks after she was last seen in the office, a severe laryngeal obstruction developed. She was admitted to the hospital, and an emergency tracheotomy under local anesthesia was done.

Direct laryngoscopy was done on June 6, 1951, and a large tumor mass was seen to occlude almost completely the larynx aditus and to arise from the left side of the larynx. A complete laryngectomy was performed on June 13, 1951.

The patient made rather a stormy postoperative recovery because of her apparent inability to understand and cooperate. However, she was discharged on Aug. 21, 1951, with the tracheal stoma clean and healed, and was eating well. There was no metastasis, as demonstrated by x-ray examination at that time.

CASE 2.—C. W. was admitted on March 7, 1952, with the chief complaint of chronic hoarseness for almost one year, having become severer in the three weeks prior to admission.

History.—The patient was in good health approximately one year prior to admission to our office, when a slight hoarseness developed. This did not improve and seemed to get worse. He had been treated off and on by his family physician for chronic laryngitis. He had no pain or soreness.

Bilateral herniorrhaphy was performed, in 1946. He had arthritis of both knees. He was treated with injections of gold preparations a year previous to admission. He had one sister, living and well. One brother died of tuberculosis and also had acute rheumatic fever. One brother died of pneumonia. His wife died at the age of 59 from a heart attack.

Physical Examination.—The patient was a well-nourished well-developed white man with a florid complexion who spoke in a hoarse whisper, lying quietly in bed. He appeared to be in no acute distress. Pulse and respiration were normal. Blood pressure was 200/96.

The eyes were normal, the skin was clear, and the lymph nodes showed no enlargement. The condition of the ears, nose, and throat was benign. The nasal septum was deviated to the left and imperforate. The pharynx was clear, and he was edentulous. The neck was supple. In the larynx, a large tumor mass involved the right cord and extended anteriorly and involved a portion of the left cord. It was seen to extend up to and included the anterior commissure. This mass appeared to be approximately 1 cm. in diameter. The heart was slightly enlarged to the left. The sounds were of good quality, without murmur. The extremities showed no edema, and the neurological findings were physiological. The impression was that of tumor of the larynx.

Progress Notes.—On March 7, 1952, suspension laryngoscopy was done. A large lesion was seen in the right cord, extending anteriorly and involving part of the left cord. A biopsy specimen was taken. The patient was discharged on March 8, 1952, after a laboratory report of fibrous tissue.

On March 21, 1952, direct laryngoscopy was done and a larger biopsy specimen taken. The pathological laboratory could not give a definite diagnosis of cancer, tending to call the condition more of a chronic inflammation.

Suspension laryngoscopy was done on March 25, 1952, and as much of the tumor mass as possible was removed. Microscopically, this showed sarcoma. It was immediately decided to do a complete laryngectomy. On March 28, 1952, a complete laryngectomy was done, and a permanent tracheal opening was made.

There were no postoperative complications except for a short period of esophagotracheal drainage, and the patient was discharged on April 22, 1952. Several chest x-rays revealed no lung metastasis. The patient was cooperating very well and eating well when discharged.

Comment.—It may be of interest to note that the total laryngectomy was performed with the use of hypotensive anesthesia (that is, by the use of a drug such as hexamethonium bromide which reduces the blood pressure to the point that very little venous or arterial hemorrhage takes place). Practically no bleeding was encountered for a procedure of this type. No transfusion was necessary, or indicated, either during or after the operation.

SUMMARY AND CONCLUSIONS

Two cases of sarcoma of the larynx are reported to add to those already in the literature.

An attempt is made to point out the fact that not only clinically but also histologically sarcoma can give the impression of a benign tumor.

We feel that thyrotomy and excision of the sarcoma alone are inadequate treatment for this type of tumor and that total laryngectomy is indicated.

277 Alexander St. (7).

TRACHEAL BUCKLING

Differential Roentgen Sign

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PROGRESS in diagnostic roentgenology need not always be along such lines as new expensive equipment, complicated injections, or even new opaque materials. It may result from a simple correlative reevaluation of existing roentgen criteria, as illustrated in the subject of this paper.

For example, in our hands a sharp, clear-cut differential diagnosis between unilateral upper lobe chronic inflammatory disease (usually tuberculosis) and cancer (usually bronchogenic carcinoma) had ofttimes been a serious problem. This embarrassing difficulty led us directly to an analytical roentgen study in the hope that one or more of the existing criteria could be utilized as a stable differential factor.

Critical analysis soon provided us with such a differential sign. It was consistently noted that unilateral upper lobe cancer was not associated with homolateral tracheal buckling, while inflammatory disease (usually tuberculosis) was. This difference was so striking that we began to use it routinely as a differential feature and were consistently and pleasantly rewarded by the correctness of the resultant diagnoses.

Deviation of the trachea from its usual course is seen in many abnormal conditions. Deviation due to pressure from without (e. g., tumors, enlarged thyroid, thymus, lymph nodes, aneurysms, and tension pneumothorax) invariably presents a smooth gentle bowing, even when extreme. No mechanical basis for acute angulation exists, since the compressing masses are always of a generally rounded configuration. Those deviations caused by a pull, on the other hand (e. g., chronic fibrotic upper lobe inflammatory disease, atelectasis, thoracoplasty, and pneumonectomy), display all degrees of bending, up to and including marked angulation

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Reviewed by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

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and buckling, depending generally on the severity of the fibrosis. The mechanical basis is, obviously, progressive gradual traction due to the shrinking action of scar tissue. Chronic tuberculosis is, more than any other important infection, associated with extensive and pronounced fibrosis.

Any tool or technique which makes easier a separation between pulmonary cancer and tuberculosis is very welcome. Acute angulation of the trachea has been recognized as a roentgenographic feature and a complication of advanced fibrotic upper lobe tuberculosis [1] but has not been sufficiently emphasized for its differential value. Such angulation, or buckling, has proved of help to us in diagnosis, since we have found it associated only with fibrotic upper lobe inflammatory disease, oftenest tuberculosis. We have never seen it in the presence of lung neoplasm except when tuberculosis was also present or rarely when the entire affected lung was atelectatic, owing to obstruction of the main bronchus. Upper lobe carcinoma, with atelectasis of the upper lobe alone, shrinks that lobe at the expense of the remaining lung, and the trachea does not buckle. The common nontuberculous secondary inflammatory conditions seen in connection with carcinoma, as well as postsurgical deformities, have, in our experience, given rise only to slight deviation or to bowing of the trachea. The physical bulk of the tumor is often such as to

Incidence and Percentage of Tracheal Buckling Among the Cases Studied

	No. of Cases	Buckling	% Buckling
Bronchogenic carcinoma	263	7	0.03
Pulmonary tuberculosis	115	63	54.8
Pneumonia	80	0	0
Boeck's sarcoid	12	1	0.8

preclude a significant amount of shrinkage. Mediastinal nodes, by firmly binding the trachea locally, may also inhibit its shift.

The course of bronchogenic carcinoma does not generally permit the development of advanced degrees of fibrotic contraction, even with complicating infections or postoperative scarring. These entities are generally not as prone to extensive scar formation as is tuberculosis.

We have gathered 115 cases (Table) of moderately advanced or far-advanced pulmonary tuberculosis with predominantly unilateral upper lobe involvement encountered at the Veterans Administration Hospital, New York, in the past four years. In 54.8% of these there was well-developed buckling of the trachea toward the involved side (Figs. 1, 2, and 3). We have not considered cases of pulmonary tuberculosis in the following categories: (1) instances of minimal unilateral upper lobe involvement, (2) cases of moderately advanced and far-advanced tuberculosis without major fibrotic elements in at least one upper lobe, (3) instances of advanced disease in both upper lobes, (4) cases of lower lobe tuberculosis, (5) cases of miliary tuberculosis, (6) cases of tuberculosis manifested predominantly by pleural effusion, and (7) cases of collapse and/or resection therapy. In all these instances there was sufficient unilateral fibrosis due to the disease to provoke distinct tracheal buckling.

1. Golden, R., editor: Diagnostic Roentgenology, New York, Thos. Nelson & Sons, 1941, p. 117. Shanks, S. C., and Kerley, P., editors: A Textbook of X-Ray Diagnosis by British Authors in 4 Volumes, Vol. 3, Ed. 2, London, W. B. Saunders Company, 1950, p. 283.

Two hundred sixty-three cases of bronchogenic carcinoma of an upper lobe (without or prior to surgery) were reviewed, in only seven of which there was buckling of the trachea. Two of these were suggestive of concomitant tuberculosis, and this diagnosis was confirmed (Fig. 4). In the other five cases the buckling

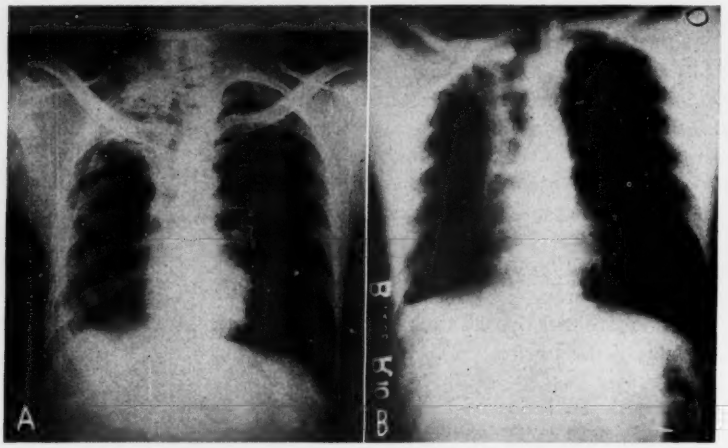

Fig. 1.— Roentgenograms in a case of pulmonary tuberculosis of the right upper lobe, with buckling of the trachea developing as the disease becomes progressively more fibrotic after unsuccessful pneumothorax partially reexpanded (*A*) and eventual stabilization (*B*).

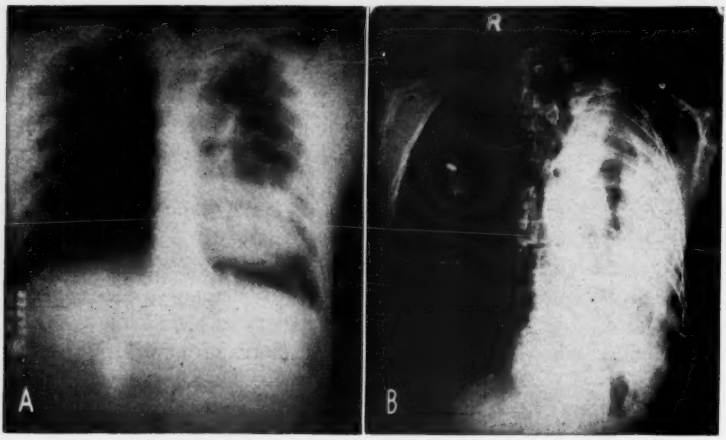

Fig. 2.—*A*, tomogram in a case of fibrotic left upper lobe tuberculosis, with trachea markedly buckled toward the diseased side. *B*, Bucky film in a case of far-advanced tuberculosis, with shrinkage and pleural effusion, showing buckling toward the lesion.

was due to massive atelectasis of the entire lung, secondary to main bronchial occlusion by tumor. In the remaining 256 cases either mild degrees of smooth bowing of the trachea (usually toward the lesion) were seen, or the trachea remained in the mid-line. Rarely the trachea was bent smoothly toward the opposite side

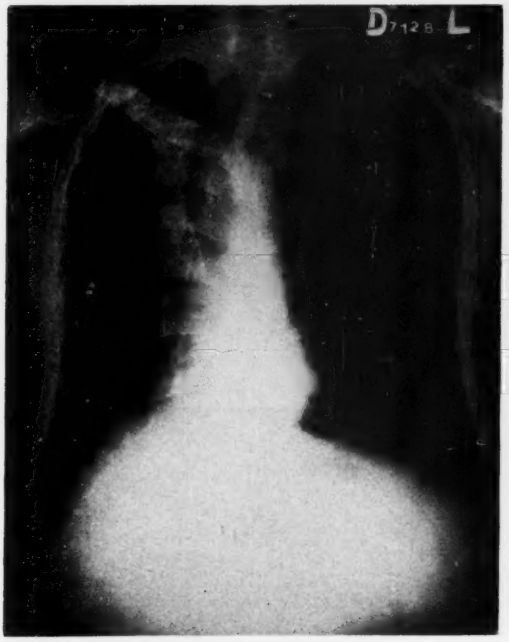

Fig. 3.—Roentgenogram in a case of fibrotic right upper lobe tuberculosis, with the trachea sharply buckled toward the site of involvement.

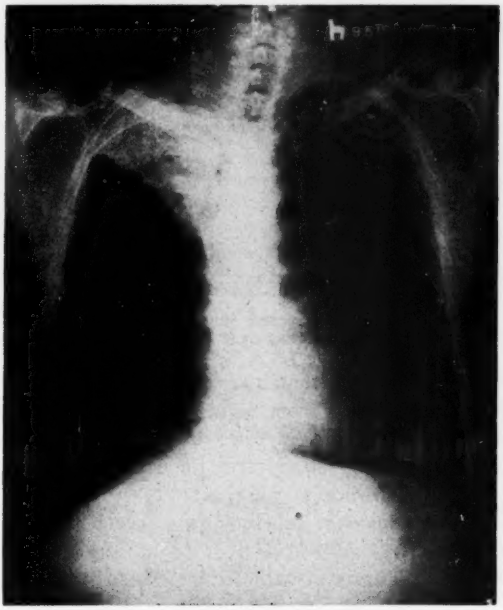

Fig. 4.—Roentgenogram in a case of bronchogenic carcinoma and tuberculosis of the right upper lobe. Tracheal buckling is seen and suggested a diagnosis of tuberculosis in this known tumor case.

by the tumor mass itself (Fig. 5) or by it in combination with its secondary metastatic mediastinal deposits. But in no case of carcinoma free of tuberculosis or massive atelectasis was sharp tracheal buckling toward the lesion noted (Fig. 6).

A smaller number of cases of pneumonia of an upper lobe (80) were studied. In none of these cases, acute or chronic, was there noted the sharp tracheal buckling seen in upper lobe tuberculosis. This finding indicates that the degree of fibrosis and pull in pneumonia is less than in chronic fibrotic tuberculosis.

Twelve cases of sarcoidosis with pulmonary involvement were studied. In only one instance was tracheal buckling observed. Long-standing sarcoid does produce marked pulmonary fibrosis, but since there is a predilection for the development of tuberculosis in this disease, it is interesting to speculate that tuberculosis may have been present in this case.

Fig. 5.—Roentgenogram in a case of superior sulcus tumor (bronchogenic carcinoma of the right upper lobe), with compression of the trachea to the opposite side due to a huge tumor mass.

There are other relatively uncommon cases of chronic upper lobe lung disease which bear mention. These include bronchiectasis, Friedländer's pneumonia, a number of major and minor pulmonary mycotic diseases (actinomycosis, coccidioidomycosis, aspergillosis, etc.), and other rarer pulmonary inflammatory conditions. However, in most instances tracheal buckling is not present, and the relatively higher incidence of upper lobe pulmonary tuberculosis makes the consideration of these other entities unimportant.

Scoliosis may give an illusion of considerable tracheal deviation, but on closer scrutiny the trachea is never seen to be angulated, or sharply buckled, from this cause.

Surgical chest procedures frequently result in tracheal deviation. This deviation is smooth and mild except in those instances in which considerable fibrosis in the

upper hemithorax is present. When sharp tracheal buckling is seen after operation, residual tuberculosis should be suspected.

Pulmonary and/or pleural fibrosis following intensive radiotherapy to the chest area is currently a live issue. In no instance have we seen tracheal buckling after such treatment.

Examples of tuberculosis in cases of bronchogenic carcinoma and of carcinoma in cases of tuberculosis are not common. When such lesions do occur together, it is usually an unexpected and surprising development. Major complications of management ensue. Series described in the literature, as well as our own experience, indicate that in 6 to 9% of cases of bronchogenic carcinoma tuberculosis is found at autopsy. This infection ranges from gross to microscopic. On the other hand, in 0.04 to 1.36% of cases of tuberculosis bronchogenic carcinoma is found.[2]

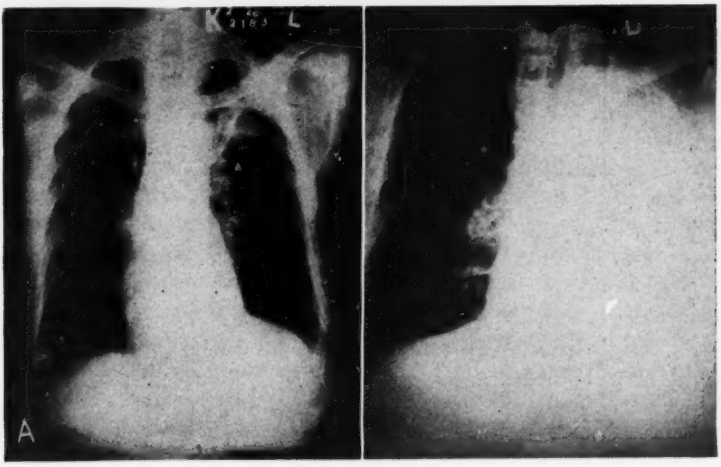

Fig. 6.—*A*, roentgenogram in a case of bronchogenic carcinoma looking not unlike an inflammatory process, for which it was at first taken. No deviation of the trachea is seen. *B*, roentgenogram in a case of bronchogenic neoplasm, with atelectasis of the left lung but uncomplicated by tracheal buckling. Only a slight smooth deviation toward the affected side is noted.

When tuberculosis and bronchogenic carcinoma coexist, the diagnostic problem is obviously a very difficult one. It is our experience that those cases of proved

2. Gerstl, B.; Warring, F. C., Jr., and Howlett, K. S., Jr.: Cancer and Pulmonary Tuberculosis: Diagnostic Problems in Patients with Cancer of the Lung in the Presence of Pulmonary Tuberculosis, Am. Rev. Tuberc. **54**:470, 1946. National Tuberculosis Association, Tuberculosis Abstracts **21**:1948. Cancer of the Lungs in Pulmonary Tuberculosis, editorial, J. A. M. A. **134**:1178, 1947. Martin, A., and Beaudet, E. A.: Carcinoma of the Lung with Pulmonary Tuberculosis, M. Bull. Vet. Admin. **17**:404, 1941. Koletsky, S.: Primary Carcinoma of the Lung: A Clinical and Pathologic Study of 100 Cases, Arch. Int. Med. **62**:636, 1938. Fried, B. M.: Bronchiogenic Cancer Combined with Tuberculosis of the Lungs, Am. J. Cancer **23**:247, 1935. de la Fuente, M. A., and Palacios, H. R.: Undifferentiated Cell Carcinoma of the Lung and Chronic Pulmonary Tuberculosis: Case Report, Quart. Bull., Sea View Hosp. **7**:314, 1942. Lózaga, N. S., and Vivoli, D.: Tuberculosis pulmonar y cáncer de bronquio, Semana méd. **1**:2022, 1934. Shefts, L. M., and Hentel, W.: Bronchogenic Carcinoma and Pulmonary Tuberculosis, Am. Rev. Tuberc. **61**:369, 1950.

bronchogenic carcinoma of an upper lobe showing homolateral tracheal buckling should be assiduously investigated for complicating tuberculosis in the same area. The only other examples of such buckling have been found in massive collapse of an entire lung due to tumor occlusion of a main bronchus.

SUMMARY

A series of 263 cases of upper lobe bronchogenic carcinoma and 115 cases of unilateral upper lobe pulmonary tuberculosis was investigated.

The incidence of homolateral tracheal buckling in each entity is presented.

Tracheal buckling is seen to represent a roentgen sign of real value in differentiating unilateral upper lobe tuberculosis from malignant tumor.

GENERAL PRINCIPLES IN TREATMENT OF NASAL HEMORRHAGE

Emphasis on Management of Postnasal Hemorrhage

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THE PRESENCE of bleeding from any part of the body, more especially from the nose, is associated with a great deal of apprehension on the part of the parents and relatives of the patient. Much is therefore expected from the physician in these circumstances: He must check the bleeding as soon as is possible and at the same time allay the fears of all concerned while protecting the welfare of the patient.

The treatment of nasal hemorrhage often seems to be very troublesome and difficult at times, unless one follows, in a systematic manner, a definite plan for its control. This condition, as a rule, is erroneously considered to be very mild and yet, if not properly managed, can become very annoying to the physician, as well as to the patient, with occasionally serious consequences. This experience is more especially true for the general practitioner and frequently so for the specialist. The treatment of this condition has been greatly abused because no organized approach is usually followed. By describing a concise step-by-step detailed routine for the control of nasal bleeding, an attempt is made in this paper to simplify what is frequently regarded to be a very serious problem. This routine may seem elementary in a way; yet it is very important to follow a logical order of procedure. Some heretofore unpublished ideas and techniques will be presented which assist in the satisfactory control of stubborn postnasal hemorrhage in particular, with the use of a minimum number of procedures and with the least amount of morbidity to the patient.

A patient can become so extremely exsanguinated from a nosebleed as to require a number of transfusions. In extreme cases, it may even become necessary to do a ligation of the external carotid artery. Spar and Hallberg [1] report that 11 of 106 patients admitted to the Mayo Clinic from 1930 to 1947 required ligation of the external carotid artery. The procedures which are described later on in this paper should tend to reduce the necessity for such radical measures.

This paper, however, is not concerned with the care of postoperative nasal bleeding, with bleeding associated with trauma, with bleeding incidental to the presence of an unrecognized foreign body in the nose, or with bleeding accompanying such systemic diseases as ascorbic acid deficiencies, hemophilia, telangiectasia, blood

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From the Ear, Nose, and Throat Department of the Polhemus Clinic and Long Island College Hospital.

1. Spar, A. A., and Hallberg, O. E.: Severe Epistaxis and Its Management: Report of 11 Cases in Which the External Carotid Artery Was Ligated, Ann. Otol. Rhin. & Laryng. **56**:141-151 (March) 1947.

dyscrasias, nasal diphtheria, the onset of acute upper respiratory infections, typhoid pneumonia, measles, scarlet fever, eroding cancers, perforation of the septum, and vicarious menstruation. These medical conditions, for the most part, do not require any local treatment, unless they involve Little's area.[2] A distinction can be made between bleeding from the nose and nosebleed. Bleeding associated with such systemic diseases as mentioned above I prefer to designate as bleeding from the nose in contradistinction to spontaneous bleeding from a purely local condition, at a specific anatomical location, designated here as nosebleed, which is the type dealt with in this paper, commonly known as epistaxis and classified as anterior nosebleed and posterior nosebleed.

CLASSIFICATION OF NOSEBLEED

There are two types of nosebleed: (1) anterior nosebleed, which is subdivided into (*a*) latent and (*b*) active, and

(2) posterior nosebleed.

1. Anterior nosebleed is most frequently due to an ulceration or a rupture of a blood vessel in Little's area [2] or Kiesselbach's triangle. This plexus of vessels is located on each side of the septum, just posterior to the edge of the septal cartilage. The vessels which form Little's area are the terminal branches of the anterior ethmoid, sphenopalatine, and superior labial arteries and veins. Anterior nosebleed very rarely comes from any part of the anterior nose other than Little's area.

(*a*) Latent anterior nosebleed is bleeding which is not present at the time the patient is seen by the physician, but a history of one or more previous episodes of bleeding is obtained.

(*b*) Active anterior nosebleed is bleeding which is present when the patient is seen or arrives for treatment. The cause of this bleeding is not definitely known. It occurs most frequently in children and occasionally in the adult. The onset is sudden. It may be slight or profuse, but usually slight, and often stops spontaneously, only to recur.

2. Posterior nosebleed, or postnasal bleeding, results from a rupture of the sphenopalatine artery. This artery courses partly along the floor of the sphenoid sinus, coming from the sphenopalatine foramen, and goes up on the anterior wall to a point just below the opening of the sphenoid sinus. Woodruff [3] claims that postnasal bleeding comes from dilated veins in the posterior part of the nose, underneath the posterior end of the inferior turbinate. He states that phlebosclerosis of the veins occurs in older people. This plexus of dilated veins he term "nasonasopharyngeal" because some of the veins lie partly in the nose and partly in the nasopharynx.

Posterior nosebleed occurs in the older person with hypertension, arteriosclerosis, or cardiovascular disease, usually owing to a rupture of the sphenopalatine artery. The onset is also sudden. It may be slight but is usually severe and rarely ceases spontaneously. For the purpose of this paper, there are no areas that cause any nasal bleeding between Little's area and the postnasal area.

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2. Rainey, J. J.: James Lawrence Little, A Forgotten Pioneer, A. M. A. Arch Otolaryng. **55**:451-452 (April) 1952.

3. Woodruff, G. G.: Cardiovascular Epistaxis and the Nasopharyngeal Plexus, Laryngoscope **59**:1238-1247 (Nov.) 1949.

DIAGNOSIS

History.—It is necessary that a proper determination of the location of the bleeding site be made in order to control intelligently the bleeding that is present before treatment can be rendered. A careful history of the onset of the bleeding will make the diagnosis easier. Is it anterior or posterior bleeding, and is it from the right nostril or the left nostril? This point is important because a great deal of time can be saved by knowing from which side the bleeding first appeared. The following questions should be asked: Did the bleeding first appear from the right nostril or from the left? Did the blood come from the nostril, or was it first noticed in the throat or the mouth, with the expectoration of blood? Frequently, when the patient is seen, blood appears in both nostrils. This condition occurs because the blood from one side passes over the soft palate and around to the opposite nostril, making it appear that there is bleeding from both sides. Bleeding seldom, if ever, occurs from both sides at the same time.

In the child or the young person, the bleeding is most usually anterior, while in the older person, it may be either anterior or posterior, but usually posterior. Anterior bleeding always appears from the nostril first, while posterior bleeding appears first in the throat or the mouth before it appears from the nostril.

Clinical Examination.—1*a.* Latent Anterior Nosebleed: Upon examination of the nose, there may be no evidence at all of any recent bleeding. Patients are frequently told that nothing can be done or needs to be done if there is no bleeding at the time of examination. This statement is not true. The bleeding point can be found. A coagulum, or clot, forms at the bleeding point which temporarily checks the bleeding, and that is the reason why the bleeding stops originally, only to recur when the clot is removed. The presence of the clot cannot always be seen upon examination, but it can be definitely located. The bleeding point is located by rubbing the mucous membrane in Little's area with a cotton-wound applicator which is dipped into an anesthetic solution of 2% tetracaine (pontocaine®) hydrochloride or 10% cocaine to minimize and eliminate the pain of rubbing. As soon as the clot has been removed by rubbing, bleeding follows. It is always necessary to produce bleeding in order that the bleeding point can be located. A diagnosis can now be made and the site from which the bleeding occurred determined. The case now passes from the category of 1*a,* latent anterior nosebleed, and is placed in the category of 1*b,* active anterior nosebleed, for its control. Bleeding will never occur when normal mucous membrane is rubbed, unless it is actually lacerated. If no bleeding follows rubbing of the anterior septal mucous membrane, the source of the bleeding must then be considered to be from the postnasal area. Frequently dilated superficial vessels are seen anteriorly on the septal mucosa, leading one to suspect that the bleeding originally came from this particular site.

1*b.* Active Anterior Nosebleed: The nose must naturally be cleaned of all blood clots present, in every case, before the nose can be examined. Blowing the nose is the best way to clean it quickly and thoroughly. In the child who does not know how to blow his nose, the blood is aspirated with a suction tip under direct vision. Then the nose is examined quickly, and at once the bleeding area, as a rule, can readily be seen if it is in the anterior part of the nose.

2. Posterior Nosebleed: If bleeding is from the posterior part of the nose, blood will more or less be seen trickling from behind the soft palate or over the pharyngeal

wall when the physician looks into the mouth. The examination is made with the patient in a sitting position. Upon examination of the nose, after the tissues have been thoroughly shrunk down with epinephrine and the nose cleaned of clots, blood can be seen flowing from between the septum and the middle turbinate area, e. g., in the region of the sphenopalatine artery. Bleeding may frequently come from varicosities posteriorly on the floor of the nose. If the source of bleeding cannot definitely be located as coming from the anterior area, the bleeding must naturally be in the posterior area and should be looked for there. Occasionally, in some cases, after the nose has been thoroughly cleaned, no bleeding can be seen at the time either anteriorly or posteriorly. Another method of diagnosis can then be employed. In such cases and in cases of mild bleeding, the use of a dry cotton applicator or a dry pledget of cotton for testing different areas in order to locate the bleeding point is resorted to. This method consists of placing the dry cotton, either applicator or pledget, first in the upper part of the nose between the septum and the middle turbinate. Then if after removing the cotton from this area it is found to be clean and not bloodstained, the bleeding must of necessity come from an area lower down. This procedure is repeated in different parts of the posterior part of the nose down to the floor of the nose. Whenever the dry cotton is found to be bloodstained upon removal, the site from which it was removed is the bleeding area. Having determined the location of the bleeding, the physician proceeds to check the bleeding as follows.

TREATMENT

The nasal and septal mucous membrane must always first be anesthetized with a topical anesthetic before the physician proceeds to check the bleeding. Proper cooperation of the patient is obtained only when there is no pain, thus making it easier to work, and thereby greatly facilitating the handling of the case.

1*b*. *Active Anterior Nosebleed.*—In the simple, mild, and ordinary type of bleeding, a pledget of cotton moistened with tetracaine hydrochloride is immediately placed in the nose. Even though this cotton pledget should become bloodsoaked and the bleeding should seep through the cotton pledget, the cotton pledget is left in place for a few minutes, long enough to produce anesthesia. If when this cotton pledget is removed bleeding is still present, the cotton pledget is replaced by another one, this one moistened with a 1 : 1000 epinephrine solution. However, after the tretracaine hydrochloride pledget of cotton is removed and before the epinephrine pledget of cotton is inserted, the physician should quickly look into the nose in an attempt to visualize in his mind's eye the spot from where the bleeding is coming and to retain a mental picture of its location. If the bleeding spot is visualized in this manner, it will not be difficult to find it after the epinephrine-moistened pledget of cotton is removed. Then the epinephrine pledget of cotton is removed. With the bleeding controlled by the epinephrine and the area dry, a chromic acid bead is applied directly to the exact spot visualized from which the bleeding occurred. The chromic acid bead should be applied lightly. The cauterized area takes on a blackish-brown color. The bleeding is now completely controlled, and no packing is even necessary. The chromic acid bead, made by fusing a chromic acid crystal on a heated wire applicator, is very easy to handle and apply. The chromic acid bead can only be applied to a dry surface to be effective and not while there is active bleeding. This point is very important.

In an emergency, in cases in which the bleeding is very profuse, with the blood literally pouring out of the nose, and when time is of the essence and the physician cannot afford to search for the bleeding point, the nose is quickly packed under direct vision. The packing in the nose is retained 24 hours or longer, with an adhesive dressing around the nostrils to prevent the packing from being sneezed out. When the packing is finally removed, the bleeding point can be more easily located, as described above, and treated with an application of the chromic acid bead.

There are other useful methods which can be employed when the bleeding is active. These methods include the application of thrombin ("thrombin topical") oxidized cellulose U. S. P. (oxycel®) gauze or aborbable gelatin sponge U. S. P. (gelfoam®) to the bleeding area, pinching the nostrils against the septum for five minutes with a packing inside the nostril, and the use of Simpson splints (compressed cotton), which swell on injection of saline or epinephrine between the layers, causing pressure to be exerted on the bleeding area. Electrocoagulation with a ball electrode applied to the bleeding area will control the bleeding while it is active. Salt pork placed in the nose and allowed to remain there for about five days has been used, but the method is rather old-fashioned. The actual cautery has been used at times. Curetting the bleeding area down to the septal cartilage with a mastoid curette works well in certain cases, and especially if the bleeding is coming from the bone, e. g., the vomer, the bone is then curetted. Isotonic sodium chloride solution or a 1.5% solution of butethamine (monocaine®[4]) hydrochloride injected under the mucoperichondrium is sometimes helpful. Sclerosing solutions and moccasin snake venom have been tried.

2. Posterior Nosebleed.—Because of the great apprehension that is present in older people, it is important at the outset for the physician to attempt to console these patients while attending them. He should try to assure and comfort them by telling them that through fortuitous circumstances they are rather fortunate. He should impress upon them the idea that the nasal hemorrhage is not nearly as serious as if it had occurred in the head, where it could just as well have happened, with an accompanying paralysis of one side of the body. As a matter of fact, a certain amount of blood loss is good. It helps to lower the blood pressure. Psychologically, the mind is put at ease to a certain extent by using such philosophy.

The physician should not forget first to anesthetize the nose, especially high up on the septum and posteriorly, before commencing treatment. In cases in which the bleeding is very slight in the area between the middle turbinate and the septum, there are two things that can be done. First, if the septum is fairly straight, high up, and posterior a small piece of plain gauze moistened with epinephrine is placed between the septum and the middle turbinate and pushed back until the resistance of the anterior wall of the sphenoid is felt; then the gauze is firmly pressed against it. This gauze pack acts as a pressure pack over the ruptured vessel. The inserted piece of gauze should be as large as the space between the septum and the middle turbinate will permit. As a rule, the bleeding will be checked after this procedure. The plain gauze pack is left in place for a week and is then removed. Oxidized cellulose U. S. P. gauze is good to use if it can be easily managed and placed in the proper location. Care should always be exercised not to traumatize the mucous membrane with the bayonet forceps when packing.

4. Novocol Chemical Mfg. Co., Inc., Brooklyn 7, N. Y.

Secondly, when there is a high deviation of the septum, with no room between the septum and the middle turbinate to put a packing there, 5 to 10 cc. of a 1.5% solution of butethamine hydrochloride [4] with epinephrine 1 : 30,000 is injected into the septal mucosa as high up and posteriorly on the septum as possible. By infiltrating and elevating the mucoperiosteum, the bleeding frequently stops but may recur after the infiltration disappears. If slight bleeding still persists, an attempt is made to fracture the middle turbinate laterally, if possible, so as to create enough room to place a piece of gauze against the anterior wall of the sphenoid, as described above.

The troublesome and more difficult type of posterior nosebleed is that in which the bleeding is very profuse, streaming out of the nose, throat, and mouth. Also, in those cases in which there is a high or other deviation of the septum, when it is impossible to put a gauze pack against the anterior wall of the sphenoid, there is only one thing left to be done, and that is to put in a postnasal pack immediately. There are several types of postnasal packs. It matters little which kind is used, whether it be the "kite tail" type described by Favazza [5] or any other. They all act in the same manner by snugly closing off the posterior choana and making pressure against the sphenopalatine artery on the floor of the sphenoid sinus and septum. The postnasal pack must be held securely in place if it is to be of any value. For this purpose, the pack should have three strong linen strings attached to it. Two strings are brought out through the nostril which has the postnasal pack in it and pulled tightly to secure firmly the postnasal pack in position; they are then tied tightly together over a piece of bandage on the outside of the nostril. The other string is allowed to hang in the pharynx, but it is cut short enough to be seen just below the level of the soft palate. If the string in the pharynx is longer or is brought out of the mouth to be fastened on the face or about the ear, the patient will pull on it and loosen or completely dislodge the pack, with the result that the bleeding will again recur. The patient feels very uncomfortable with this packing in place, but the use of sedatives will help to make it more bearable until it is removed. There is no necessity for packing the rest of the nose when the postnasal pack is used. If the nostnasal pack does not control the bleeding, packing the rest of the nose or packing both sides will do no good. Bleeding rarely occurs from the anterior and posterior part of the nose at the same time, provided the case was not mishandled beforehand. The pastnasal pack is not disturbed for 24 to 48 hours. With the use of penicillin and other antibiotic drugs today, there is very little danger of complications arising from infection around the Eustachian tube due to the presence of the postnasal pack. To remove the postnasal pack, the physician first cuts the two strings which were tied together in front of the nostril. Then slowly but gently he pulls on the string in the pharynx, which is caught in an artery clamp, easing it out of position and out of the mouth. No further bleeding, as a rule, will take place.

If the bleeding is localized as coming from the area about the floor of the nose, posteriorly as from phlebosclerosis, as described by Woodruff, and if it is definitely determined that the bleeding is not coming from higher up from the sphenopalatine vessels, the procedure for its control is as follows: After the use of proper topical anesthesia and shrinkage with epinephrine, the inferior turbinate is fractured toward

5. Favazza, A. G.: Technic of Postnasal Packing for Uncontrollable Epistaxis with "Kite-Tail" Tampon, New York J. Med. **50**:1240 (May 15) 1950.

the septum and away from the lateral nasal wall; room is thus created to place a firm gauze pack which rests on the floor of the nose underneath the posterior part of the inferior turbinate. This pack is held in place by the inferior turbinate and more especially so after the turbinate mucous membrane returns to normal after the shrinkage action of the epinephrine has disappeared. In order that additional pressure be exerted in this location, another firm gauze pack is then placed on the floor of the nose between the septum and the inferior turbinate posteriorly, pressing the inferior turbinate back into position, thereby increasing the pressure against the pack which is underneath the inferior turbinate. In this manner, pressure is applied from outside the inferior turbinate, as well as underneath it, directly to the bleeding point. This packing will not slip backward or out of position because it is firmly held in place by this process. This method can also be employed when bleeding is still present after a postnasal pack has been inserted and the bleeding can be seen to be coming from the posterior part of the floor of the nose.

Now, if bleeding continues after 24 hours with the postnasal pack still in place, it is useless to temporize any longer. Something else must be done, immediately, before the patient otherwise becomes exsanguinated. It then becomes necessary to use more radical measures for its control. For this situation, excellent results are obtained in most cases by doing a submucous resection and by removing only the bony septum. The technique employed is as follows: With the postnasal pack still in place, both sides of the nose are anesthetized, with the use of pledgets of cotton saturated with equal parts of 10% cocaine and epinephrine 1:1000 for topical anesthesia. The nasal mucous membrane is then well infiltrated with a 1.5% solution of butethamine hydrochloride [4] with 1:30,000 epinephrine solution, a larger quantity of the solution being injected over the posterior portion of the septum. After the anesthesia has been completed, the postnasal pack is removed and the submucous resection started. Before the surgery is begun, there is no bleeding present because it is controlled by the infiltration of the septum. No further packing is necessary after surgery except that ordinarily used after any septum operation. If a submucous resection of the bony septum is done early and in more cases, the necessity to ligate the external carotid artery will be greatly reduced or entirely eliminated.

Dickie [6] cited Kindler [7] as advising a total resection of the septum in cases of intractable postnasal hemorrhage. Hallberg [8] recommends a submucous resection as a preliminary treatment for severe hemorrhage in the posterior part of the nose in an effort to identify the bleeding point. He shows that about 40% fewer ligations of the external carotid artery were done at the Mayo Clinic in a series of cases tabulated from 1945 to 1950 than were done in a series from 1930 to 1944. This reduction in the number of ligations of the external carotid artery in all probability was due to the fact that a submucous resection was resorted to more frequently in his later series.

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6. Dickie, J. K. M.: Nasal Hemorrhage and Its Treatment, Canad. M. A. J. **58**:121-126 (Feb.) 1948.

7. Kindler, W.: Das Nasenbluten bei Angiomatosis (Oslerscher Krankheit), seine Entstehung und Behandlung, Arch. Ohren-Nasen-u. Kehlkopfh **143**:236-240, 1937.

8. Hallberg, O. E.: Severe Nosebleed and Its Treatment, J. A. M. A. **148**:355-360 (Feb. 2) 1952.

It is difficult to understand why a submucous resection should control postnasal bleeding, but it does in the majority of cases. However, several theories may be postulated:

1. If bleeding continues in spite of the postnasal pack, the bleeding may be coming from the dilated plexus of veins underneath the posterior end of the inferior turbinate, which Woodruff [3] described, and which is not reached by a postnasal pack but is controlled by the elevation of the mucous membrane during a submucous resection.

2. It may also be that the infiltration of the anesthetic raises the mucoperiosteum of the septum, sphenoid, and floor of the nose from its bed and temporarily produces pressure upon the vessels there, long enough to form a clot, in addition to the effect of the vasoconstrictor action upon them by the epinephrine in the solution injected.

3. There may also be a certain amount of postoperative tissue reaction to the infiltration and surgery which produces edema that constricts the vessels by its pressure and thus controls the bleeding.

4. After the mucous membrane has been elevated from the septum, there may be a change in the position of the bleeding vessel when it is lifted from its original site, permitting it to retract or thrombose as a result of the relaxation or tenting of the mucous membrane.

5. The elevated septal flaps may alter the relationship of the sphenopalatine arteries to the rigid resected bony septum when the flaps heal together, uniting as a membranous septum. This effect gives the arteriosclerotic vessel an added advantage of mobility to retract with whatever slight elasticity might remain in it, which it does not have when the rigid bony septum is in place.

Age is no problem or deterrent factor in performing a submucous resection operation. Secobarbital (seconal®) sodium, 3 grains (0.20 gm.), and morphine sulfate, ¼ grain (15 mg.), should be given before operation. After operation, the patients should receive sedatives, such as phenobarbital, ¼ grain every four hours, and glyceryl trinitrate, 1/100 grain (0.6 mg.) three times a day, and bed rest.

It is doubtful whether the use of rutin and ascorbic acid are of any value in arteriosclerosis. Vitamin K is only useful when prothrombinopenia is present and is not a factor in these types of cases.

The care of shock from hemorrhage has not been considered a part of this paper and therefore is not dealt with.

PRECAUTIONS

A nosebleed should not be treated before first anesthetizing the mucous membrane of the nose.

A packing should not be placed in the nose blindly. It should always be done under direct vision with the use of a nasal speculum and a proper light. The mucous membrane is frequently lacerated by the ends of the bayonet dressing forceps when the packing is inserted blindly, without the physician looking to see just exactly where the packing is being placed.

Packing saturated with any caustic astringent solutions, such as silver nitrate, ferric chloride, Monsel's solution, alum, and acetic acid, should not be used. These solutions merely produce hundreds of minute areas of ulceration on the nasal mucous membrane, thereby complicating the case by creating many more bleeding surfaces, in addition to the one that is present.

The nose should not be packed in a hit-or-miss manner, with the hope that the packing may cover the bleeding point. A definite determination of the bleeding point must always be made before treatment can be successful. Inflatable balloons, rubber pneumatic packs, described by Stevens,[9] marine sponges, as used by Dixon,[10] finger cot packing, Simpson tampons, etc., are at times useful, more especially in emergency treatment only in cases of profuse bleeding.

Packing in the nose should not be placed more than halfway back between the anterior and the posterior nares. If the packing is placed farther back than this, it may slip back into the nasopharynx and make the patient feel that he is choking.

The two sides of the septum should not be cauterized at the same time. If they are, a perforation of the septum will result.

Caustic astringent solutions carried on a cotton applicator should not be applied, because the action and spread of the solutions to normal surfaces cannot be controlled.

The patient should not be told to throw the head back, with the idea that this action will stop the bleeding, because it does not. The blood naturally will not flow from the nose with the head thrown backward but, instead, flows down the pharynx to be swallowed, only to be vomited later on. The patient should bend the head forward, instead. In this manner, the severity of the bleeding can be determined more accurately by watching the degree of blood flow.

Dropping a cold key down the back, placing ice packs on the nose, or pressing the upper lip with the finger should not be tried. They are of no value whatsoever.

SUMMARY

A method for the proper determination of the location of a nosebleed is presented.

A systematic practical program and routine for the treatment of nasal hemorrhage, both for the anterior nosebleed and for the posterior nosebleed, are outlined.

Some new concepts and several suggestions are offered for the early and proper management of postnasal hemorrhage.

It is recommended that a submucous resection of the bony septum be performed without delay if the postnasal bleeding is not checked in about 24 hours after the insertion of a postnasal pack.

The submucous resection should be done in all cases of intractable postnasal hemorrhage as soon as possible.

With the plan herein outlined for the care of postnasal hemorrhage, the necessity for ligation of the external carotid artery will be greatly reduced or eliminated, especially if action is taken promptly.

The mechanism involved in performing a submucous resection for the control of a postnasal hemorrhage cannot be definitely understood. All that can be said for it at the present is that it is still empirical. Several theories, however, are offered in explanation of the modus operandi, as to how such a result might be accomplished.

760 Eastern Parkway (13).

9. Stevens, R. W.: Nasal Packing: The Rubber Pneumatic Pack, A. M. A. Arch. Otolaryng. **54**:191-194 (Aug.) 1951.

10. Dixon, O. J.: Epistaxis: The Use of Sterile Marine Sponges in Its Control, J. Missouri M. A. **45**:824 (Nov.) 1948.

LINGUAL THYROID

Historical Data, Developmental Anatomy, and Report of a Case

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THE PURPOSE of this paper is to present, as accurately as possible, an analysis of the cases of lingual thyroid reported to date, including all available historical data as to embryology, incidence, anatomicopathologic features, diagnostic procedures, and treatment. There is also added a personal case, with clinical history, operative procedure employed, postoperative course, and a clinical and basal metabolism check over a 12-month period. Sketches of the tumor mass and the operative technique are included, as are photomicrographs of sections of the tumor.

HISTORICAL DATA

The first case is credited by all writers to Hickman,[1] an Englishman, who reported, in 1869, the death by suffocation of a newborn baby with an enormous thyroid tumor in the base of the tongue. A close study of the description by Hunt,[2] an American, in 1865, of his experience with a case of tumor on the base of the tongue in a young woman will suggest that this was a case of thyroid tumor, although not proved. There are no illustrations, and no histological description is given in either the article in the *American Journal of the Medical Sciences* or the duplicate article in the *Transactions of the College of Physicians of Philadelphia,* but his description might have been that of any one of the 200 proved cases that followed in the literature, and the postoperative course was almost identical with the experience Haynes had, in 1912, with a young woman from whom he had removed a proved thyroid tumor of the tongue. Hunt did not remove the growth but left it in situ to slough away after strangling it with ligatures. It sloughed well enough, and the patient died. He was very emphatic that the death was not due to strangulation; in fact, William Pepper did the tracheotomy, which was to no avail. The patient's dizziness, weakness, nausea and vomiting, and final collapse correspond startlingly well to the patient's experience in Haynes's case.

1. Hickman, W.: Congenital Tumor of the Base of the Tongue Pressing Down the Epiglottis on the Larynx and Causing Death by Suffocation Sixteen Hours After Birth, Tr. Path. Soc., London **20**:160-161, 1869.

2. Hunt, W.: Tumor of the Posterior Portion of the Tongue, Tr. Coll. Physicians, Philadelphia (1865) **4**:153-157, 1863-1874.

Hunt [2] described a tumor in a girl, aged 16 years, situated on the posterior part of the tongue and immediately in front of the epiglottis.

It apparently completely filled the fauces, but the velum could be readily raised from it and the finger passed behind and around its posterior surface and upon drawing the tongue forward and depressing it, the parts behind were seen to be entirely normal. In all other respects, the patient appeared to be perfectly healthy. Five years before [i. e., before puberty], a physician had examined the throat and at that time the tumor was the size of a small pea on the middle of the posterior surface of the tongue. The surface of the tumor was very red, with large distended vessels coursing over it. There was no pulsation. It was quite elastic, and had an indistinct fluctuating character but not decided enough to indicate fluid. The opinions as to its nature were various but favored the view that it was an hypertrophy of glandular tissue and probably connected with the part known as the foramen cecum at the apex of the circumvallate papillae.

After describing the operation, he says as follows:

An incision was then made into it and a small amount of a peculiar gelatinous-looking substance exuded, but there was no disposition to empty itself. The material was at once examined under the microscope, and its character agrees more with the adenoid or glandular variety of morbid growth than with any other form.

The operation was done on Saturday.

On Sunday she had some sickness of stomach, with vomiting. By night, had marked fever, pulse running up to 120 . . . . is very sensitive to light and wishes the room darkened. On Monday the same symptoms continued in a more aggravated form. [He attributed them to the mass of strangulated sloughing tissue.] One A. M. [Tuesday] she complained of lightness in the head. At 2:30 A. M., a sense of smothering.

At 5 a. m. she was unconscious, respirations were limited, the lips were blue, the face was livid, and the pulse was small, quick, and irregular. There was no relief from drawing the tongue forward or from tracheotomy, and she died four hours later.

Autopsy showed no edema of the glottis, and the larynx and the trachea showed no abnormality. As to the cause of death, Hunt thought that it was not suffocation. He thought that it was "transference of irritation from the ligated tumour to the respiratory centres, and that the vessels of the brain became secondarily involved, as indicated by the 'lightness in the head' and the 'drowsiness'." The third supposition was coincidence.

A comparison may be made between the above case and Haynes's experience, in 1912, with a proved case of lingual thyroid in which he had performed an operation. This case was of a young woman, aged 18 years, with a tumor at the base of the tongue covered with dusky mucous membrane with a network of vessels. It was tense, elastic, not fluctuating, fixed, and not painful. It was removed by the suprahyoid route and had a dense capsule, as of a very vascular hypertrophic thyroid, although it was easily shelled out. "The postoperative course was very interesting." She was operated upon on November 9.

On November 24 she had an attack of dizziness, falling off the chair apparently in a faint. She complained of pain in the back of the head and said she could not see. She was nauseated and vomited during the night. On the following day she felt weak and sick and could not leave her bed. She refused all food. On November 26 her temperature was 101°, pulse 100. She lay huddled up in bed with the covers drawn tightly around her, and her eyes closed in a "dopy"

state. She could be aroused and answered when spoken to, but volunteered no information and paid no attention to her surroundings. Otherwise the examination was negative; she was put on thyroid extract in tablet form and under this medication she steadily improved.

It would appear that Hunt was describing an experience with an unrecognized thyroid tumor of the tongue and that, had it been so named, he could be given the honor, which has been Hickman's, of having recorded the first recognized case of thyroid tumor of the tongue.

INCIDENCE

Lingual thyroid, or goiter, has been the subject of complete treatises, notably in the hands of continental writers. Dore,[3] in 1922, is generally credited with having brought the literature completely up to that date, with a total of 80 cases, his own making 81. Apparently, no one subsequently has taken the trouble to search the literature, and this figure has been generally accepted. It is possible, however, to identify between Hunt's report, in 1865, and Dore's thesis, in 1922, 91 additional cases, making a total of 172, while in the same year, 1922, two reports were published, in addition to Dore's. Subsequent to Dore's publication, 72 cases have been reported. Recent writers have referred rather loosely to "about 130 cases reported in the literature," but the total is nearer 242.

Not all summaries of case reports can be taken at their numerical value. For instance, Kohl included in his list of cases of lingual thyroid the case of Barwell, the case of Ogle, and two cases of Glas. Barwell's case was one of a lateral aberrant goiter, in Ogle's the lesion was not lingual, and Glas's case was one of adenomyomata, for which Glas made no claim of thyroid relationship.

In an unusually comprehensive review Montgomery [4] gathered all the cases of lingual thyroid nodules reported in the literature through 1936, of which there were 231 possible cases, only 144 personally authenticated and accepted by him. Of these 144 cases there were 142 instances in which the lesion occurred on the dorsum of the tongue and only two instances in which the thyroid tissue developed in the body of the tongue. Among these cases of lingual thyroid nodules there was one case reported by Montgomery. The criteria of authenticity accepted by him are the following: 1. The examination of the removed specimen should reveal thyroid gland tissue. 2. In lieu of this requirement, thyroid insufficiency should supervene after removal of the nodule. 3. Finally, the lesion should appear in the substance of the tongue between the epiglottis and the circumvallate papillae.

Montgomery reported only those cases in which the lingual thyroid tumor was causing symptoms. The incidence of thyroid tissue originating in the median anlage and not producing symptoms will doubtless never be established. Montgomery's review subsequently appeared in a monograph to which reference should be made for an analysis of case reports appearing in the literature in 1936. Shortly after this review appeared, Buckman [5] published a summary of cases reported up to and including 1935. He included in his tabulation 242 cases, including one of his own.

3. Dore, F. R.: Contribution á l'etude des goitres de las base de la langue, Thesis for the Doctorate in Medicine, Bordeaux, 1922.

4. Montgomery, M. L.: Lingual Thyroid: Comprehensive Review: I., West. J. Surg. **43**:661-669, 1935; II., ibid **44**:54-62, 1936; III., ibid. **44**:122-128, 1936; IV., ibid. **44**:189-195, 1936; V., ibid. **44**:237-247, 1936; VI., ibid. **4**:303-309, 1936; VII., ibid. **44**:373-379, 1936; VIII., ibid. **44**:442-446, 1936.

5. Buckman, L. T.: Lingual Thyroid, Laryngoscope **46**:765-784; 878-897; 935-955, 1936.

There is a marked discrepancy in the number of cases reported by these two authors. This is probably due to the fact that the criteria of authenticity adopted by Montgomery were evidently not those of Buckman, who included at least 32 cases in his series which did not meet the criteria of Montgomery.

It seems that Hickman's report of a case of congenital tumor of the base of the tongue, published in 1869 and authenticated by Montgomery, is the first case on record of a lingual thyroid nodule. Bernays, in 1888, removed a lingual thyroid tumor substantiated by histologic examination. A fairly extensive search of the literature revealed approximately 14 cases of lingual thyroid nodule for the period from 1936 to 1945 inclusive. Some of these case reports are unusually brief and lacking in sufficient pathologic data to be completely authentic. Some possibly have escaped notice because they were published under designations other than lingual thyroid.

In a further review of the literature many reports have been encountered regarding aberrant thyroids, but there is no record of toxic aberrant goiters. Rienhoff reports that he and his associates were unable to find any record of the occurrence in the true aberrant thyroid tissue of any condition other than a simple goiter, except in a case of ligneous thyroiditis and a case of carcinoma of lingual goiter. No cases of Basedow's disease developing in true aberrant thyroid tissue could be found. The lingual and intralingual glands seem to be those about which the most has been written. Cattell found reports of two lingual thyroids in 7,600 thyroid operations at the Lahey Clinic, and Ulrich found reports of two lingual thyroids in 4,000 thyroid operations at the University of Pennsylvania Hospital. None of these was reported as toxic, and the symptoms were of an obstructive nature.

It is self-evident that this type of thyroid is existent from birth. The greater percentage of the lesions in the reported cases occurred in women and were brought to the patient's attention by the physiologic enlargement of the gland associated with puberty and in some cases with pregnancy. Some women noted a definite enlargement of the lingual thyroid during menstruation. Enlargement also followed operations for ovarian cysts. Following thyroidectomy there has been a compensatory enlargement of the accessory lingual thyroid. In younger patients, if the gland on the tongue is small it may be accidentally discovered or, if increasing in size, may so interfere with swallowing as to impair nutrition. Dyspnea may be an outstanding complaint, or there may be a disturbance in phonation.

DEVELOPMENT OF THYROID GLAND

The thyroid is one of the earliest recognizable structures to develop in the embryo, being found in those 3 to 4 mm. long. The anlage appears almost contemporaneously with the formation of the first pharyngeal pouch or only a little later as a prominence on the ventral wall of the pharynx. It soon becomes constricted to form a stalked vesicle, the hollow stalk being the thyroglossal duct of His. The vesicle becomes a solid pyriform mass, which enlarges caudalward as a bilobed mass and becomes isolated from its origin at what later becomes the base of the tongue by constriction of the upper end of the epithelial cord, which is the obliterated thyroglossal duct. The site of origin after birth is marked by the foramen cecum. The duct usually disappears, but it may persist as a hollow epithelial cord extending

from the tongue toward the thyroid body. Cysts forming along the line of the thyroglossal duct may persist after birth but are not to be confused with islands of thyroid tissue left along the same tract, although thyroid tissue has been identified in the walls of such cysts.

Bochdalek (1886) described such remains as a blind pouch opening on the base of the tongue and called it the "canalis excretorius linguae." His (1885) called this canal the "ductus lingualis," later (1891) referring to it as the "ductus thyreoglossus," when he had occasion to remonstrate with Kanthack (1891) who had denied the finding of His in what appears to be a rather inconclusive, but controversial, article. Said His, "Had Kanthack been acquainted with the work of Streckeisen, which he seems to have overlooked, so would he have been spared his doubt." A. Vater (1723), cited by Erdheim, had introduced a sound deeply into the foramen cecum and believed this to extend to the thyroid gland and thus to act as an excretory duct for the thyroid.

The isolated bilobed mass of embryonal thyroid tissue as it descends in the neck is composed of irregular cords of cells, disposed, for the most part, transversely, and enlarges laterally and dorsally. The lateral lobes are united by the isthmus, which represents the main body of the median anlage and may extend upward as the pyramidal lobe. The lateral masses engulf the more caudal portion of the outpouching from the fourth pharyngeal pouch, the so-called ultimobranchial (postbranchial) body, but this contribution in man undergoes reticulation and degeneration and disappears (Kingsbury, 1935). Verdun, cited by Keibel and Mall, had previously rejected the name "lateral thyroid anlage," which had been applied to the ultimobranchial bodies by the older anatomists. Badertscher (1918) had found in the pig that the ultimobranchial bodies participate only to a small degree in the formation of thyroid follicles. In thyroaplasia, the defect of (middle) thyroid anlage, the ultimobranchial body gives rise to no thyroid tissue (Maresch, 1898, Puecker, 1899, Erdheim, 1904, and Dieterle, 1906). Lahey[6] (1923) argued that the development of myxedema following removal of a lingual goiter clinically refutes the possibility of thyroid tissue arising from a median anlage; then, even though this be removed, myxedema should not result if lateral anlagen exist, because thyroid tissue should have developed which would have prevented it.

Accessory thyroid bodies after birth occur somewhere in the tract along which the median anlage has descended during its ontogeny, but a second group may arise in a somewhat different way. The thyroid enlarges by lateral sprouts, and apparently one or more of these may become detached from the rest of the gland. The shifting backward, in a relative sense, which subsequently occurs in connection with the main mass, may leave these detached bodies behind, and, as the third pair of aortic arches straighten out to form the internal carotids, they may become closely associated with them. In this way one may explain the occurrence of isolated masses of thyroid tissue in the region of the upper part of the neck, and in the neighborhood of the angle of the jaw, which have become enlarged and subsequently removed (Peter Thompson, 1910).

Cattell (1931), however, citing Wenglowski (1912), seems to lean towards the view of the older anatomists, saying that groups of cells arising from the ulti-

6. Lahey, F. H.: Lingual Goiter, Surg., Gynec. & Obst. **36**:395-397, 1923; Tumors of Neck, J. A. M. A. **138**:264-274, 1948.

mobranchial body pass downward and come into relation with the main thyroid body. He cites Norris (1918), who showed that these cell groups fuse with the lateral thyroid gland. He believes that an arrest in the lateral descent will account for lateral aberrant thyroids and that this is a logical explanation of their origin.

Gachet's case of left-sided lingual goiter, with a normal pretracheal right lobe, was an interesting example of associated maldevelopment. In this case the man had also hemiatrophy, or maldevelopment, of the left mandible and lack of development of the left internal ear.

Eiselberg,[7] as well as many other authors, gives credit to Verneuil [8] for first recording the discovery of thyroid gland tissue isolated elsewhere in the neck from the main thyroid body. Verneuil (1853) himself, however, gives credit to Cruveilhier [9] (1852) for previously recognizing thyroid tissue elsewhere in the neck than the normal location and to L. Gendre (1852) for a prior description of the pyramid, along which they found thyroid rests. Verneuil states as follows:

I have little to add to this [Cruveilhier's] description. In later times, in dissecting the insertion of the muscles of the tongue to the hyoid bone, I have run across a small mass of glandular appearance, strongly adherent to the lower part of the superior border of that bone, between the geniohyoid and the genioglossus. This mass was red, soft, buried, of the volume of a large pea, with a smooth surface, of a homogeneous tissue; I have examined it microscopically and found there thyroid gland tissue.

The Italian writers trace evidence of reports of isolated thyroid gland tissue to earlier writers. Notably, Cecca (1901) says as follows:

From the observations of Morgagni, Laluette and Santorini, it was apparent in the eighteenth century that some of the observers suspected the possible presence of accessory thyroids in the suprahyoid region. Albert Haller (1756) recognized these isolated glandular nodules which he mentioned but did not describe, saying: "I have seen a real gland that was situated before the median thyroid cartilage but did not belong to the thyroid itself."

Fiori (1903) gives priority to Albert Haller (1779) for the description of aberrant thyroid nodules. Gruber (1876) also gives priority to Haller by an earlier date (Elementa physiologiae corporis humani, Lausanne, 1757-1778, Vol. 3, p. 196) for recognition of a separate gland springing from the medi cornu. According to Cecca, Luigi Porta (1849) devotes an entire page to the description of two or three small nodules, separated from the thyroid but connected with it through a pedicle, which have the same texture and are seen both in children and in adults.

Porta's observations escaped the attention of foreign savants so that Bruch in 1852 and Verneuil in 1855 reported several examples of accessory thyroid glands as something new . . . . Virchow in 1863 confirmed Verneuil's observation that in two cases the pyramid had lost its connection with the main part of the gland to which it was united with a long thin filament, from which he assumes that the pyramid may itself simulate accessory lobules if you are not careful in dissection. But Morgagni made the same observation 150 years before.

Gruber (1876) made a study of 300 cadavers of Russians, confirming completely the work of Porta but adding several important points: 1. He was the first to call these lobules "accessory thyroid gland." 2. He described the accessory lateral and

7. Eiselberg, A.: Surgical Aspects of Goiter, Wien. klin. Wchnschr. **38**:13-16, 1925; Goiter, Deutsche Ztschr. Chir. **172**:305-318, 1922.

8. Verneuil: Recherches anatomiques pour servir à l'historie des cystes de la partie supérieure at mĕdiane du cou, Arch. gĕnĕrales de médecine **1**:450-468, 1853.

9. Cruveilhier, J.: Traité d'anatomie descriptive, Paris, Lobé, 1852, Vol. 3, p. 543.

inferior gland. 3. He admitted the existence of accessory glands far away from the thyroid, and, although he never questioned the common origin, he was never able to give an explanation of it.

Zuckerkandl (1879) in a study of 200 cadavers found in 57 instances a prehyoid gland and in 14 one below the hyoid bone, but he did not consider the glands above the hyoid bone as accessory thyroids. Zuckerkandl's observations were almost simultaneous with those of Kadyi (1879) who identified accessory thyroids and distinguished them as "Zungenbeindrusen" (glandulae hyoides), dividing them into glandulae suprahyoides and glandulae praehyoides according to their relation to the hyoid bone. He recognized these as rests of the middle lobe separated from the lateral lobes in the descent.

Wolfer (1880) substantiated these findings and explained their position before the hyoid bone through the influence which the development of the neck organs, especially the larger vessels, exerts on the epithelial rests, in which they press the same ventrally so that the union of the copula of the hyoid bone and the horns goes dorsalward.

Streckeisen (1886) felt that one has to differentiate sharply between the thyroid gland tissue and cysts of the hyoid bone as heterologous structures.

The thyroid gland of the hyoid bone is connected with the processus pyramidalis: The cysts of this bone on the other hand possess intricate relation with the cysts of the root of the tongue and to those on the tip of the processus pyramidalis. Both, however, thyroid glands and cysts, are not distinct, but often combine one with the other.

Lahey [6] (1923) identifies aberrant thyroids according to location as follows: Those which remain at the foramen cecum are the true lingual goiters; those within the tongue, the intralingual goiters; those below the tongue, the sublingual goiters; those in front of the larynx, the prelaryngeal goiters. Two other locations are within the superior mediastinum and just outside the sternomastoid muscle in the posterior triangle of the neck (Fig. 1).

"Allied accessory thyroid" is an extruded adenoma still attached to the thyroid by fibrous bands. "Pseudoaccessory thyroid" has an isthmus of true thyroid tissue, joining the mass to the thyroid. "True accessory thyroid" has no connection with the normal gland.

Other authors call the "accessory thyroid" that mass of glandular tissue existing at a distance from the normally situated gland. The "aberrant thyroid" is the entire mass of thyroid developing apart from the normal location at which no thyroid has developed. Lingual thyroid, or goiter, can then be either accessory or aberrant, depending on whether thyroid tissue simultaneously exists in the normal location or not. As will be seen in the analysis of the recorded cases of lingual thyroid, instances of both will be found.

The present discussion has only to do with lingual, intralingual, and sublingual thyroids, or goiters, the sublingual being the suprahyoid (Kadyi) and prehyoid (Kadyi, Streckeisen, and Zuckerkandl).

Regardless of the opinions of the great writers as to development of the thyroid or the manner in which its development may be expressed, we now offer a simple summary:

In the process of fetal development the thyroid gland develops from a median diverticulum, which appears about the fourth week on the summit of the tuberculum

impar but is later found in a furrow immediately behind the tuberculum. It grows downward and backward as a tubular duct, which bifurcates and subsequently divides into a series of cellular cords from which the isthmus and the lateral lobes of the thyroid gland develop. The connection of the diverticulum with the pharynx is termed the "thyroglossal duct," its upper end being represented by the foramen cecum of the tongue and its lower end by the pyramidal lobe of the thyroid gland. The thyroglossal duct is divided into upper and lower portions, the lower extending from the hyoid bone to the pyramidal lobe of the thyroid gland. While the thyroglossal duct usually passes behind the hyoid bone, it may be situated in front

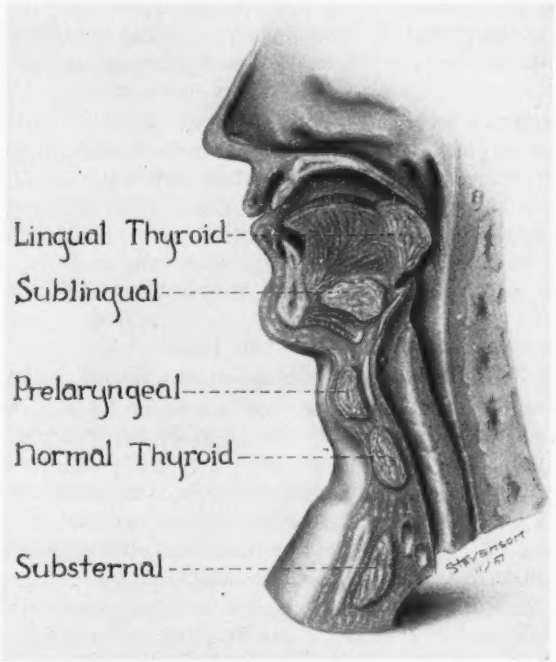


Fig. 1.—Sketch showing commonest locations of aberrant thyroid tissue in relation to the normal thyroid.

of or may pass through the substance of the bone itself, a condition made possible by the later fetal development of the hyoid bone.

Since the hyoid bone in its early stages crosses the line of descent of the thyroid primordium, 40% of all embryonic thyroids become entangled with the developing hyoid. Thyroid tissue has been found in the nasopharynx, trachea, esophagus, lateral cervical regions, and hyoid bone. When remnants of thyroid tissue persist at the foramen cecum, they are called lingual thyroids; when within the tongue, intralingual; when below the tongue, sublingual; when in front of the larynx, prelaryngeal; when in the normal position anterior or lateral to the upper rings of the trachea, pretracheal, and when in the superior mediastinum behind the sternum, retrosternal.

In the event that a deficiency of the normal thyroid occurs (surgically or otherwise), these embryonic rests often grow and compensate for it. These developments are thus not to be regarded as new growths. Ectopic tissue may function so well that a congenital absence of the normal thyroid may never be known. However, the realization of such a condition may come when special stress, such as puberty, pregnancy, or lactation, exists and excites hypertrophy and hyperplasia of the aberrant tissue. This condition we believe to be due to puberty in the case to follow, and we believe this to be the situation in many cases.

The ectopic gland is sometimes the only thyroid tissue present and thus has the sole function of the thyroid, whereas in other instances the ectopic gland is an accessory to tissue in the normal location or to tissue in other abnormal places. Consideration of these factors is important when one has to anticipate the development of myxedema when the abnormally placed gland is removed. Certainly we were not able to locate thyroid tissue elsewhere in our case.

Thyroid anomalies occurring in the tongue are of interest to the surgeon not only because of the practical problems involved in their surgical treatment but also because of their embryonic origin and the various parenchymatous changes to which they are subject. The favored site for the occurrence of thyroid tissue in the tongue is at its pharyngeal portion in the region of the foramen cecum. The term "lingual goiter" should be applied to hypertrophic thyroid tissue at the base of the tongue in those instances of nonmigration of the thyroid anlage from the region of the foramen cecum.

DEVELOPMENT OF TONGUE

The tongue consists of two portions, the body anteriorly and the base posteriorly. The anterior portion is formed from the region between the first and the second branchial arches, from which projects dorsally the tuberculum impar of His. In 1885, His held that the tongue was formed by enlargement of the tuberculum impar. Immediately behind the latter is a deep evagination of the epithelium (embryos of 5 mm.), which is the median thyroid evagination, and behind this again is a transverse elevation formed by the ventral ends of the second and third branchial arches, the copula. The part corresponding to the foramen cecum is the remains of the median thyroid evagination. According to Keibel and Mall (Manual of Human Embryology, 1912, Vol. 2, pp. 343-346), as early as 1869 Dursy had described the body of the tongue as having a paired origin, a condition more recently described as occurring in man by Kallius and by Hammer (1901). From the anterior portion of the copula and the neighboring portions of the second arch the root of the tongue develops.

ETIOLOGY

Lingual thyroid is essentially an embryonic malformation, a vestigial rest appearing on the base of or within the tongue or below it along the course of the thyroglossal duct of His. We can surmise no cause for this malformation. It is found in women in 74% of the cases reported (78 in women, 27 in men, and the sex not being indicated in 37 cases). Because disturbances of the thyroid gland are more apparent in girls in puberty and in women during pregnancy, it might be argued that as many disturbances occur unnoticed in men but escape attention because the gland is less active in the sexual sphere. Anglesio felt that the cases observed and reported are a very small percentage of the actual cases that must exist.

Of 140 reports in which such details were noted in women, in 30% the growth occurred in puberty; in 55%, between the ages of 18 and 40 years; in 10%, in the years of the menopause, and in 5%, in old age. In 7 cases the growth was noted in infants, in addition to those found at autopsy which had not given evidence in life, and in 11, in childhood. In Demuth's case, involving a boy, the growth first appeared in puberty.

Anglesio, Carnelli, Droesbecque, Leulier, Seelye, and Rubeli reported cases in which hemorrhage from the mouth occurred coincident with menstruation or in which the growth appeared coincident with the first menstruation or fluctuated with menstruation. In Rubeli's case there was alarming enlargement of a lingual thyroid in the last month of pregnancy, necessitating Caesarean section. The growth subsided promptly after delivery of the child. Rubeli regarded lingual thyroid an indication for interruption of labor and a contraindication to breast feeding. Warren reported a case in which the growth first appeared in a woman after the birth of her youngest child, 30 years before. The compensatory development of a lingual thyroid following thyroidectomy was reported by van Selms and following pathologic destruction of the normal thyroid gland, by Willis.

Trauma appeared to be the inciting factor in cases of Goris, Kohl, and Walther. Haynes, Bloch, Straus, and Warren reported the first appearance to follow a "cold," influenza, or an upper respiratory infection. The growth in Wolf's case appeared to date from whooping cough, in Perkins', from diphtheria, in Anglesio's, from an intestinal infection with recurrences, in Lenzi's, from typhoid, and in Hartley's from "fever." In Caderas' case, involving a man, the onset of the growth was dated from exposure to war gas, and in Zehner's from the loss of the patient's husband in war, a fear neurosis. "That such a developmental possibility can be assumed is easily understandable in the variable disposition of women which stands in relation with the sexual sphere."

The lesion in Hickman's case caused suffocation at birth. The description of Meixner's case has a dramatic appeal. A woman called to her maid and said that a fetus had been passed. The navel cord was pulled off. The dead body was found under the couch, wrapped in a cloth, and attempts at resuscitation were fruitless. In the lung secretions and mouth were microscopic particles (dishwater elements). The thyroid in the neck was absent, but at the base of the tongue was a growth pushing down on the larynx to close it. The opinion was that the child was born a few weeks before normal time but could have lived only a short time anyhow because of the obstructive lingual growth and that an unnecessary attempt had been made to drown it in dishwater.

APPEARANCES

The typical lingual thyroid occupies the median line of the base of the tongue between the foramen cecum and the epiglottis as a rounded, hemispherical mass, often lobulated but covered with normal intact mucosa, through which a varying degree of vascularity is marked by a plexus of superficial veins. The color is usually reddish, of a different hue from the tongue itself, but varies to bluish. It is circumscribed, distinct from the glossal structure, on a broad base, not attached to the lateral or the posterior confines of the fauces, and reaching to, but not adherent to, the epiglottis, which may be pressed backward to such a degree as to cause suf-

focation. When visible, it may reach such size as to "fill the pharynx" but, as will be seen, may be submerged in the glossal musculature or may be only small islands within the base of the tongue. The cases reported in which the growths had a pedicle are limited (Livi, Harvey, Moulonguet, Caderas, and Bishop).

The sublingual variety may present itself in the submental region as a rounded swelling beneath the skin, fixed to the musculature but circumscribed, and moving with the movements of deglutition.

The lingual tumor is semisoft or firm, elastic, not fluctuating, painless and not tender, and not blanching with pressure. The palpating finger can be passed around it and between it and the epiglottis.

SYMPTOMS

The subjective symptoms are those of a mass, or foreign body, in the throat, sufficient to give a constant desire to swallow something that will not be moved. Dysphagia is a common complaint, and yet with very large tumors of this sort there has been no difficulty in swallowing even solid food. In the face of the common complaint of "something stuck in the throat" the possibility of lingual thyroid should be borne in mind and ruled out.

Dysphonia, the "pharyngolalia" of the Italian writers, is common. Dyspnea, especially nocturnal, is usual and has been described to be of alarming proportions, obtaining the degree of suffocation. One patient received "energetic cauterizations of the nasal turbinates" for obstructive breathing, without the difficulty being recognized as a lingual thyroid tumor.

The abundant vascularization of the thyroid gland in this exposed location has led to hemorrhage from the mouth, varying from blood-streaked saliva to abundant and alarming hemorrhage. Indeed, this has been a common initial symptom. When hemorrhage has occurred, it is usual to find eroded areas on the surface of the growth.

Despite the apparent possibility of frank symptoms developing from a growth in this location, cases are recorded in which the subject has reached death in old age without any known complaint referable to this site. Many other growths have been recognized casually by the patient, a friend, or an examining physician without any symptom before the discovery having suggested such a growth, and others, having been recognized, have produced no symptoms or complaints which have demanded removal of the tumor.

Endocrinal disturbances in connection with lingual thyroid are usually not due to the lingual tumor itself. It happens, however, that a lingual thyroid may be the only thyroid tissue present and by the degenerative processes common to the thyroid gland may produce disturbance of the endocrine system which may then be properly attributed to the lingual tumor itself.

It is reported that in 70% of the cases the thyroid in the neck is absent, a fact which calls for consideration before surgical treatment is instituted. The lingual thyroid usually is found to give a histologic appearance of normal thyroid tissue. But the growth may be affected and may show any of the changes seen in the thyroid in its normal situation, such as cysts, adenomas, or malignant tumors. If the secretory function of the gland is altered, its host may exhibit a clinical picture seen in

such conditions. Toxic symptoms from hyperactivity occur, and, on the other hand, cretinism and myxedema have been seen. These conditions, however, are in the minority.

It is easy to understand that there may be no symptoms associated with this condition, particularly if the growth is small. If the growth is larger, it is so located as to be traumatized frequently during deglutition and give rise to hemorrhage, which Bronson S. Ray states occurred in varying degrees in 10% of the cases reported. The patients complain of a fulness in the throat and difficulty in swallowing, breathing, and talking. Following trauma there may be ulceration and occasionally pain, and the breath may have a fetid, offensive odor.

Certainly most of the above symptoms were demonstrated in our case.

DIFFERENTIAL DIAGNOSIS

The diagnosis of tumors of the neck can be extremely simple or so obscure as to make the final diagnosis possible only by exploration and biopsy. Because of the fact that malignancy is not rare in them it is important to determine their character as early as possible; the need to know their origin and character is not far removed from that in tumors of the breast, according to Frank Lahey. He further states that biopsy or removal of all tumors, exclusive of the lipomas which can occur anywhere in the neck, should be promptly done after discovery. Since the tumor mass in the case presented was on the base of the tongue, we feel that it is only necessary to establish a differential diagnosis of those tumors which arise in the midline. Most midline tumors or cysts can be disposed of without too much discussion, since, except for the occasional inflammatory submental mass and dermoid, they are related either to the thyroid itself or to the developmental descent of this gland from the back of the tongue to its normal place on the upper tracheal rings. However, of the midline cysts and tumors the most dramatic, as well as the rarest, is the lingual thyroid, and by the same token the commonest is the thyroglossal cyst, each being the result of a developmental failure: in the lingual thyroid, the failure of the thyroid to descend, and in the thyroglossal cyst, the failure of the thyroglossal tract to close. We have previously mentioned that lingual thyroids are supra, intra, and infra in location in relation to the back of the tongue, and there is very little to be said about the diagnosis of these tumors, since their consistent location always at the same point on the back of the tongue marks them as lingual goiters. However, one must remember that any other tumor-like mass may occur in the midline of the neck, and we can think of no better classification than that offered by Frank Lahey.

Lingual goiter
- Supra
- Infra
- Intra

Thyroglossal cysts

Pyramidal lobe
- Hyperplastic

Aberrant thyroid tissue along this midline tract

Adenoma of isthmus

Medial dermoids

Lateral tumors, discrete
- Inflammatory salivary gland swelling with stone
- Mixed tumors of the submaxillary gland
- Carotid body tumors
- Branchial cysts
- Neurofibromas
- Discrete parathyroid cancer
- Discrete aberrant thyroids
- Discrete Hodgkin's disease
- Discrete lymphosarcoma
- Discrete primary carcinoma of neck (branchial tract origin)
- Discrete tuberculous cervical nodes
- Discrete adenomas of the thyroid
- Lipomas
- Lateral dermoid cysts

Lateral multiple tumors
- Hodgkin's disease
- Tuberculous cervical glands (multiple)
- Multiple aberrant thyroids
- Multiple colloid adenomatous goiter
- Hygromas of neck

Low tumors of neck extending into mediastinum
- Intrathoracic goiter
- Fibromas of esophagus
- Virchow's glands
- Cancer secondary to carcinoma of stomach
- Cancer secondary to carcinoma of lung

A thorough evaluation of all these tumors, their location and consistency, and the symptoms complained of by the patient in our case leaves us with but one diagnosis: supralingual goiter.

REPORT OF CASE

B. T., a white girl aged 12, fairly well-developed and moderately nervous, was referred to Dr. Waters by Dr. Thomas who had seen the patient on the previous day, Feb. 22, 1951, complaining of a bloody discharge from the mouth of several days' duration and also difficulty in swallowing, muffled speech, and a marked choking sensation. The referring physician noticed a large raw mass on the base of the tongue. The referred diagnosis was "cyst of the tongue."

History.—Family: She has five brothers and three sisters, all living and well.

Past: She had rickets in early childhood and did not walk until the age of 3. She had the usual childhood diseases. The history elicited from the family was that her nervousness dated back to December, 1950, or three months previously. The mother had noticed for several weeks that there was a bloody mucus-like discharge on the pillows in the morning, and occasionally the patient would spit up some blood-tinted mucus. Difficulty in swallowing had become rather pronounced, with some pain and there was a definite so-called thickening, or impairment, in speech, also of several days' duration.

Menstrual: She began menstruation at the age of 11, with a regular fair flow and with little or no cramps.

Physical Examination.—The patient was an unusually cooperative, moderately nervous child weighing 100 pounds. Blood pressure was 120/80 and the pulse rate 96 beats per minute, regular, with no murmur. Physical examination gave essentially negative results as far as the nose

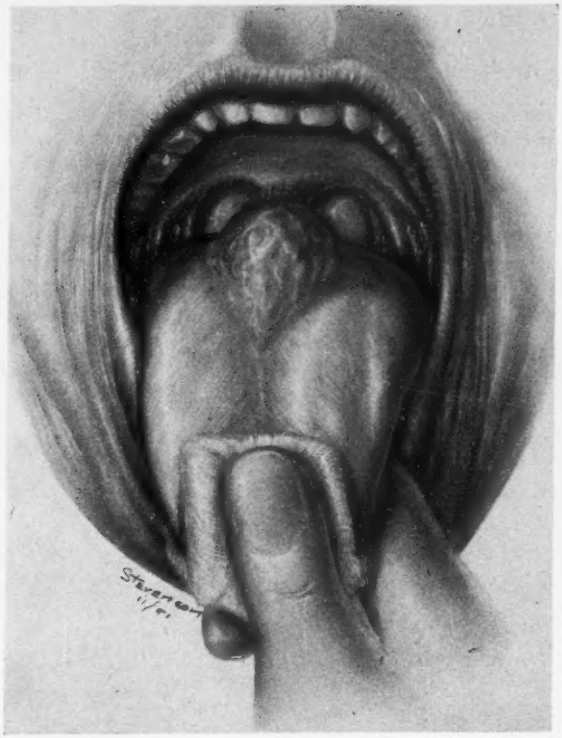


Fig. 2.—Sketch of tumor mass. Tongue is drawn forward, showing contact with uvula and palate with ulceration.

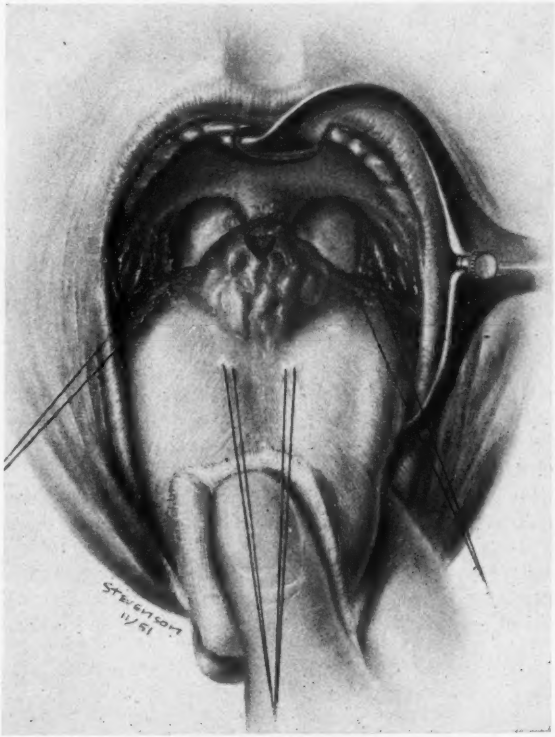


Fig. 3.—Sketch of tumor mass showing watermelon-like slice removed for biopsy with the use of local anesthesia.

and throat were concerned, except for hypertrophied and infected tonsils and a large soft hemispherical elastic mass in the midline of the dorsum of the tongue, the mass measuring about 3 cm. in width, 4 cm. in length, and 1.5 cm. in height. The apex of this mass was ulcerated; the color was reddish. It was covered, except for the ulcerated area, by the mucous membrane of the tongue (Fig. 2). The throat was then sprayed with a 2% tetracaine (pontocaine®) hydrochloride solution, and an indirect laryngoscopy was performed. The mass was seen to occupy the most posterior aspect of the dorsum of the tongue and had no continuity with other structures of the pharynx or the larynx. No other growths were noted. A direct laryngoscopy was done, and the same findings were noted. It could be seen that the apex of this mass during

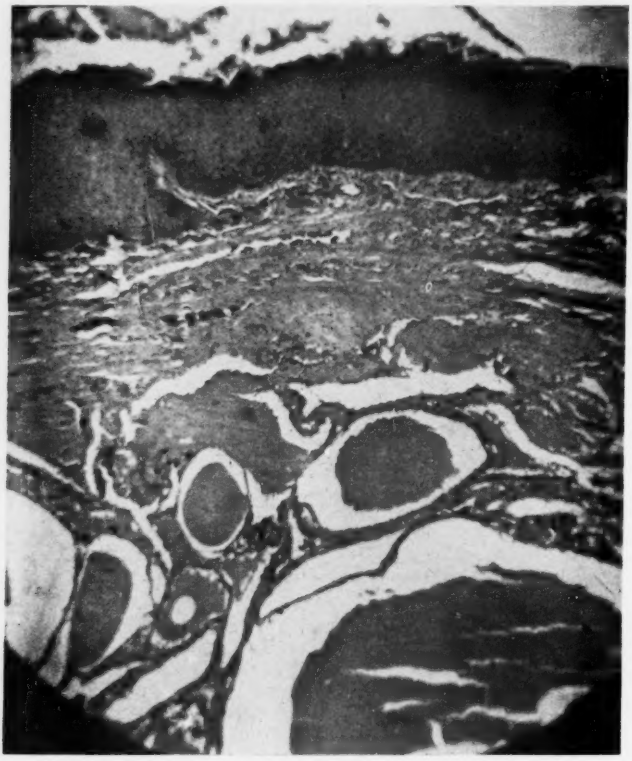


Fig. 4.—Section of biopsy specimen (× 1,000; hematoxylin and eosin stain; 6 mm. thickness).

the process of deglutition was making contact with the palate; hence, the explanation of the ulceration and difficulty in swallowing was provided. An attempt was made to aspirate its contents, with the use of a 20 gauge needle and a 5 cc. syringe, but to no avail, the thought being a possibility of a cyst of the tongue.

The patient was admitted to the Peninsula General Hospital on February 23, and on February 24 a further attempt was made to establish a diagnosis, with the use of local anesthesia consisting of 2% tetracaine hydrochloride spray augmented by 1½ grain (0.1 gm.) of pontocaine (nembutal®) sodium given 1½ hours before examination and ½ grain (30 mg.) of codeine given 45 minutes before the time of operation, and this further augmented by local infiltration around the circumference of the mass with procaine hydrochloride 1% with epi-

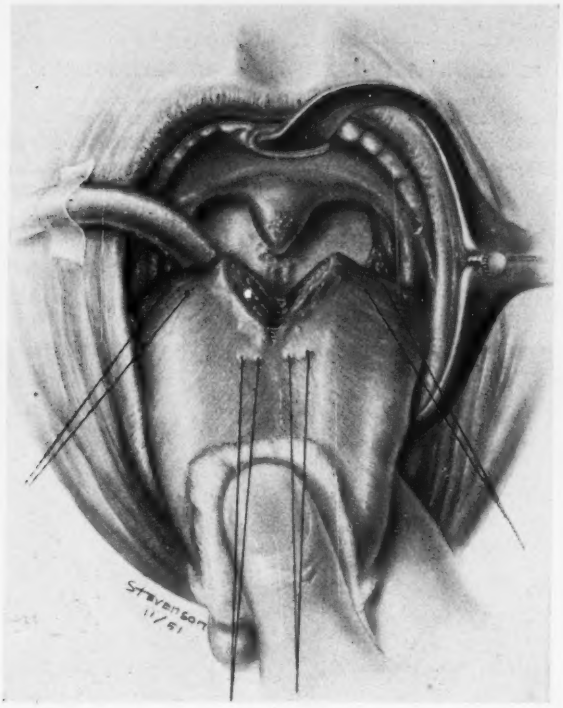


Fig. 5.—Sketch showing V-shaped portion of tumor mass excised, with traction sutures and emergency ligatures in place. Note ulceration of uvula, palate, and posterior pharyngeal wall.

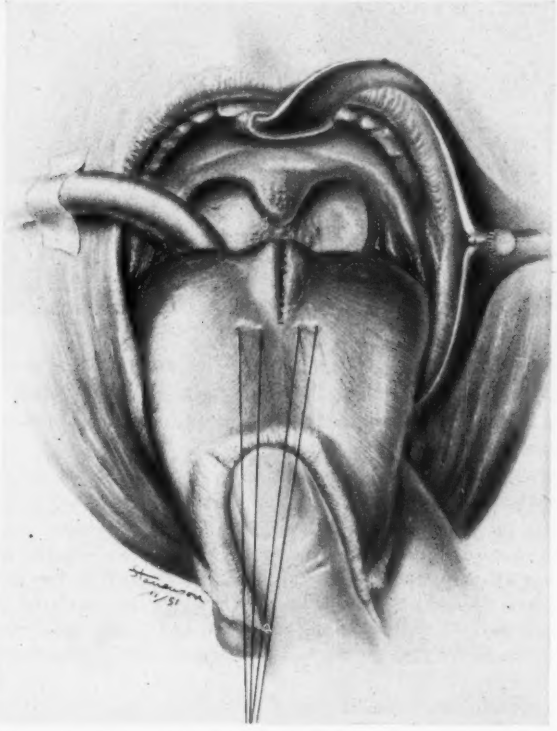


Fig. 6.—Sketch showing approximation of remaining tumor mass with No. 0 braided silk sutures. Note marked increase in pharyngeal space and airway.

nephrine hydrochloride 1: 50,000. A small elliptical incision was made from the apex down through the entire substance of the mass, removing a small watermelon-like slice. Very little bleeding was encountered, and the two No. 4-0 silk sutures were used to approximate the edges (Fig. 3). This specimen was sent to the laboratory and a frozen section requested. The frozen section showed ectopic thyroid gland of the oral cavity. The basal metabolism rate on this day, being checked in the early morning previous to the above procedure, was found to be +15. On admission, February 23, the blood count showed a rather marked reduction in hemoglobin and a moderate drop in red blood cells. The urinalysis gave normal results on admission.

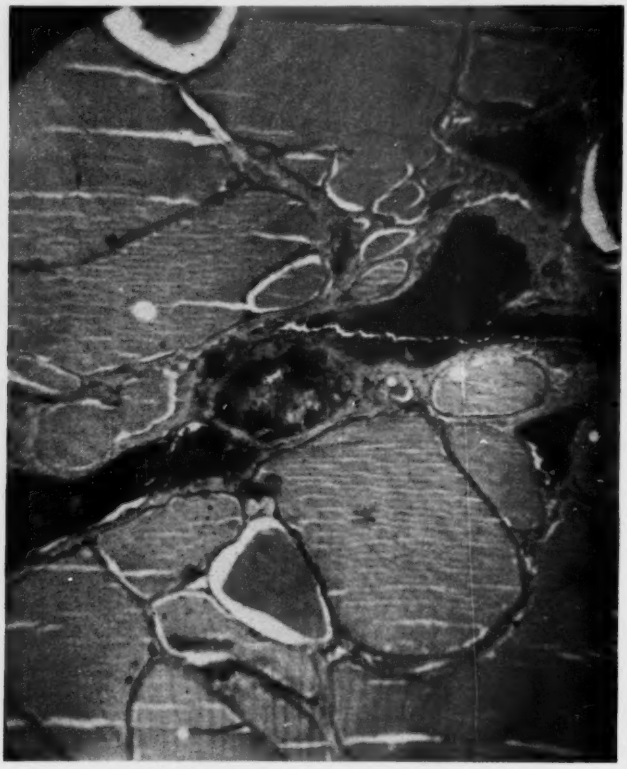


Fig. 7.—Section of interior of mass (× 1,000; hematoxylin and eosin stain; 6 mm. thickness).

Report of First Biopsy.—The specimen was a soft red fragment, 1 by 0.7 cm. The frozen section showed a mucosal surface, with stratified squamous epithelium. Attached to it was a glandular structure resembling thyroid.

The fragment on paraffin section showed a covering of mucosa of the oral type. Beneath it was an area of thyroid tissue with large glandular acini filled with colloid (Fig. 4).

Treatment.—On the morning of February 26, 1951, with the patient under general anesthesia, a subtotal removal of this thyroid tissue was done, an endotracheal tube having been passed without any difficulty, the tongue being pulled well forward by two silk sutures placed on either side near its tip, and with suitable ligatures already in position to be tied lateral to the mass on the dorsum and posteriorly. An elliptical incision was made and an equal portion taken on either side of the center through the entire thickness of the visible portion of the mass.

Approximately one-half of the visible mass was removed in this manner (Fig. 5). The edges were carefully approximated with No. 0 braided silk sutures. Not too much bleeding was encountered, although the pharynx had been carefully packed around the endotracheal tube, and it was not found necessary to tie the sutures previously placed laterally on either side of the mass (Fig. 6).

Postoperative Course.—The patient was returned from the operating room in excellent condition, and a transfusion already prepared was not found necessary. On March 3, 1951, the basal metabolism rate was +5.

Report on Examination of Mass Removed at Operation.—The mass was an irregular piece of firm brown tissue, 2 by 1 cm., with mucosa on one side.

Histologic examination showed thyroid tissue with large acini filled with colloid. Over it was mucosa of the type found in the mouth. The site of the biopsy was marked by a hemorrhagic area in the mucosa which included suture material (Fig. 7).

COMMENT

We acknowledge the use of radioactive iodine in the localization of thyroid tissue,[10] and we only regret that our institution was not geared with the proper armamentarium to make this test possible, as we did not possess a Geiger-Müller tube, nor had any of us any experience in this technique. We realize that systemic measurements of iodine uptake and plotting of profile curves definitely demonstrate the presence or absence of thyroid tissue and also give information as to the relative size and distribution. We further realize that one cannot distinguish thyroid tissue from colloid cysts and metabolically from the inactive carcinoma, adenoma, and active carcinoma and that this method is only of value as a preliminary study and should be supplemented by at least a biopsy, as well as a basal metabolism test.

We had previously used diagnostic methods to detect any likelihood of the mass being of a cystic nature, and, although we had not supported our contention that this mass was thyroid tissue by the use of radioactive iodine, we had certainly obtained more substantial evidence from the pathologist by biopsy. We had not been able to palpate any thyroid tissue or mass in its normal location, and we were strongly of the conviction that we were dealing purely with thyroid tissue on the base of the tongue per se, and that there was very little likelihood of there being thyroid tissue elsewhere. We felt that the basal metabolism rate of + 15 was represented by the mass on the base of the tongue and that extreme care must be taken in its removal lest we find the patient after operation in a state of myxedema or with conditions making it necessary that she take thyroid extract for the rest of her life. Furthermore, we were cognizant that this mass fluctuated in size and that the symptoms were enhanced by menstruation; it was just after the menstrual period that the patient was seen. However, in view of the symptoms aforementioned and the patient's discomfort, plus the moderate and continuous loss of blood, a partial or subtotal removal of this mass was deemed necessary without further ado.

Since the surgery was to be performed by one of us (Z. J. W.), an otolaryngologist, the oral route was elected. We had no hesitancy in explaining to the family prior to the operation that this mass was a thyroid tumor and that its removal might be attended by some gain in weight or might necessitate the use of thyroid extract.

10. Feitelberg, S.; Kaunitz, P. E.; Wasserman, L. R., and Yohalem, S. B.: Use of Radioactive Iodine in Diagnosis of Thyroid Disease, Am. J. M. Sc. **216**:129-135, 1948. Nachman, H. M.; Crawford, V., and Bigger, I. A.: Radioactive Iodine (I^{131}) in Localization of Thyroid Tissue, J. A. M. A. **140**:1154-1156, 1949.

Fortunately, a monthly check over a 12-month period has failed to present any evidence of dysfunction, and we feel reasonably sure that enough time has elapsed for myxedema to present itself. No such symptoms or signs are apparent.

In July, 1951, a tonsillectomy and an adenoidectomy were performed, with an uneventful recovery. The basal metabolism rate has been checked each month since the date of operation and has ranged from a + 5 to a — 4.

410 S. Division St. (Dr. Waters).
Peninsula General Hospital (Dr. McCullough).

Case Reports

RHINOSCLEROMA

WALTER B. HOOVER, M.D.
AND
G. DAVID KING, M.D.
BOSTON

RHINOSCLEROMA is rare in North America, even in foreign-born persons. It was recently stated that with more world travel the incidence of rhinoscleroma in this country would increase. To date, this prediction has not been fulfilled. Therefore it seems worth while to report a case of rhinoscleroma in which the patient was treated with one of the newer drugs.

REPORT OF CASE

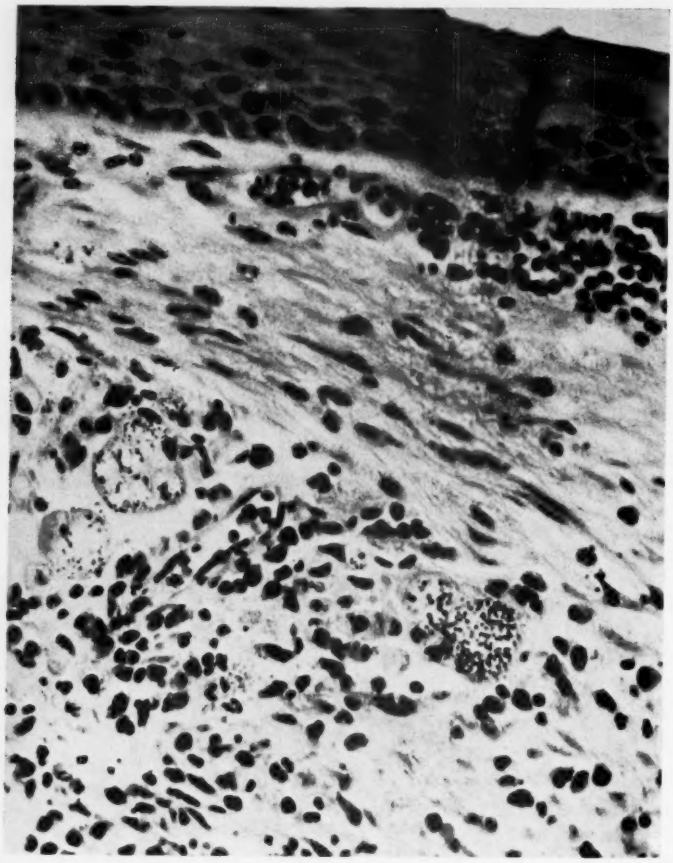
The patient, a 56-year-old Russian-born shoe worker (1952), came to this country at the age of 5 years and was first seen by members of the department of otolaryngology of the Lahey Clinic in November, 1938 (at the age of 42), at which time she complained of hoarseness of three years' duration. The history was normal except for the fact that two relatives had had chronic nasal conditions characterized by discharge and crusting. The results of the physical examination were normal, with the exception that the nose showed inflammation with crusting and the larynx showed an irregular outcropping on the anterior half of both true vocal cords extending into the anterior commissure and superimposed on the posterior surface of the epiglottis. There was no fixation of either vocal cord. A presumptive diagnosis of carcinoma of the larynx was made, and the patient was advised to enter the hospital for laryngoscopy and biopsy. However, she went to another hospital, where laryngeal biopsy was performed. The pathologic diagnosis was hyperkeratosis.

The patient was next seen, in 1944, by members of the department of internal medicine of the Lahey Clinic because of a gastrointestinal complaint. The physician who saw the patient at that time made a note that the patient was still hoarse, that the left side of the nose was obstructed, and that the nasal mucosa was congested, with at least one area which bled easily.

The patient was not seen again until July, 1950, when she came to the department of otolaryngology because of left nasal obstruction of seven years' duration. At that time, the examination showed a tumor mass which filled the anterior one-third of the left nasal cavity. This appeared to originate in the left inferior turbinate. The patient was advised to enter the hospital for excision of this mass, but she refused and was not seen again until May, 1951. At that time, she returned because of the same nasal obstruction. The tumor mass, by this time, had increased in size so as to occlude the left nostril completely. The mass projected slightly forward through the nostril and at least halfway through the posterior part of the nose, and it was firm, reddish-brown, and granular. A biopsy specimen of the mass was taken at this visit, and the pathologic diagnosis (by Dr. William A. Meissner of the New England Deaconess Hospital) was rhinoscleroma (Figure). Roentgenograms of the sinuses revealed left pansinusitis. The patient presented a twofold problem: the first, treatment of the rhinoscleroma, and the second, drainage of the sinuses. The following week the patient entered the hospital, and a large quantity of granulomatous tissue was removed from the left nasal cavity. The mass

From the Department of Otolaryngology, the Lahey Clinic.

was firmly attached to the middle and inferior turbinates and to the septum, and it was possible to remove almost all of it. Bleeding was moderate and easily controlled. Cultures, taken at this time, revealed heavy growth of a Gram-negative rod, the biologic activity of which coincided with that described for the von Frisch bacillus. Sensitivity tests were done on these bacteria and showed them to be susceptible to streptomycin and also to terramycin. They were not sensitive to aureomycin or penicillin. Accordingly, the patient was given streptomycin, 0.5 gm. intramuscularly every six hours for one week, then 0.5 gm. every eight hours for another week,



Mikulicz cells, together with numerous contained Gram-negative rods, can be seen clearly. Several fairly characteristic Russell bodies are present. Note the replacement of the normal ciliated columnar surface by stratified squamous epithelium (hematoxylin and eosin stain and differential Gram's stain; × 400).

as well as a nasal spray of streptomycin in a concentration of 20 mg. per cubic centimeter to be used four times a day. At the completion of this treatment, both sides of the nose appeared perfectly normal clinically.

The patient has been examined at regular intervals and has shown no evidence of recurrence of rhinoscleroma. It is interesting to note that the slides of the laryngeal biopsy specimen taken in 1938 were reviewed in the light of the fact that the patient had rhinoscleroma but did not reveal the disease.

COMMENT

For many years, rhinoscleroma was thought to be a condition which is common in a few places and absent in the rest of the world. As time goes on and cases are reported from all over the world, this point of view has to be revised. However, there are a few places, such as southwestern Russia, portions of Poland, the Balkans, Guatemala, El Salvador, and central Mexico, which are foci of the disease, and here rhinoscleroma appears to be endemic. The disease is a rarity in this country, as evidenced by the fact that approximately 120 cases have been reported in the United States and Canada, but of these, only about 24 cases were found involving native-born persons.

Rhinoscleroma appears to be a specific infectious disease caused by a bacillus similar to Friedländer's bacillus called Klebsiella rhinoscleromatis, or von Frisch's bacillus. This view has had increased support in recent years. Others believed that the bacillus was a secondary invader, but now that the use of antibiotics is able to rid the tissue of the bacillus and all signs and symptoms of the disease disappear, this result strongly suggests that the organism is the cause of the disease.

The history of rhinoscleroma is that of a chronic and an insidious disease. It can affect any portion of the respiratory tract but usually begins in the nose and paranasal sinuses. It then may extend through the nose to the nasopharynx, larynx, trachea, and bronchi. It appears to have three stages in its clinical course, although these may coexist to a degree. The first stage might be called the atrophic rhinitis stage, and the appearance of the nose can easily be mistaken for an atrophic condition. Drying, atrophy, and purulent crusting are present in the nasal cavity. This stage may last months or years and is gradually superseded by the second, or hyperplastic, stage of the disease, when fungating granulomas gradually form in the nose, obstruct it, sprout out the nostrils, and grow posteriorly into the pharynx and larynx. These masses enlarge, bleed easily, become secondarily infected, and by their pressure cause gross facial deformity. This stage may continue for years, and death may occur from asphyxia, intercurrent infection, or other causes secondary to marked debilitation and cachexia. If the patient survives this stage, these masses gradually become avascular and sclerotic and form extensive scarring and stenosis but show no further tendency to grow.

The diagnosis of rhinoscleroma is made by biopsy. The process, histologically, is a characteristic one. A granulomatous type of chronic inflammation, increased cellular and vascular elements, and three almost diagnostic cell groups are present. The first group, the Mikulicz cells, are large (30 to 50 μ in size) and multinucleated with a lacy, or foamy, clear cytoplasm. Second, the Gram-negative bipolar von Frisch bacillus may be seen in the Mikulicz cells or in the lymph spaces. The third characteristic element is the Russell, or hyaline, body (15 to 35 μ in size), a homogeneously eosinophilic cell with an eccentric nucleus. When Mikulicz cells, von Frisch bacilli, and Russell bodies are seen together in a slide of granulation tissue, the diagnosis of rhinoscleroma can be made.

The therapy of rhinoscleroma has undergone marked change in the antibiotic era. Whenever its use has been reported, streptomycin appears to be universally successful, even when used in moderate doses for relatively short periods. It is

possible that terramycin is also an effective drug. Sensitivity tests on cultures made from organisms from the patient in our case showed them to be sensitive to it. It would appear wise to institute any surgical procedures necessary to improve inadequate nasal and sinus drainage secondary to the condition. In any suspected case of rhinoscleroma, biopsy and culture should be done before treatment is begun, so that the results can be properly evaulated.

SUMMARY

A case of rhinoscleroma is presented, together with the management and apparently successful outcome. The subject of rhinoscleroma is reviewd briefly, with special emphasis on the present-day attitude regarding its origin and treatment.

MASTOIDITIS, PETROSITIS, AND LATERAL SINUS THROMBOSIS

Report of an Unusual Case

IAN BRADBURN, M.D.
PHOENIX, ARIZ.

THIS CASE deserves reporting because of the unusual combination of etiologic factors and the severity of the illness from which the child, at least in part, recovered.

REPORT OF CASE

L. J., a 4-year-old Navajo girl, was admitted to the Phoenix Medical Center hospital on Nov. 19, 1951, with a questionable history of bilateral aural discharge and vaginal discharge of three weeks' duration.

Physical examination on admission revealed a poorly nourished child with a rectal temperature of 99.6 F.

Examination of the ears showed that there was a large central perforation on the right, with a moderate amount of purulent discharge. The left tympanic membrane was completely destroyed, and there was a large defect in the annulus posteriorly. There was a pulsating foul-smelling thick purulent discharge.

There was generalized lymphadenopathy, this being most marked in the left postauricular and left anterior and posterior cervical regions.

There was left facial weakness. The heart and lungs were normal. The abdomen was slightly distended but not tender. The labia were red, edematous, and tender.

The results of the remainder of the physical examination were noncontributory.

On admission smears from the vagina and the left ear were positive for gonococci but negative for acid-fast bacilli.

Treatment was started with the administration of penicillin in oil, 300,000 units daily, and streptomycin, 0.25 gm. twice a day. Her temperature, however, became septic in character and on the fourth hospital day spiked to 104.8 F. At this time it was noted that there was fluctuation over the left mastoid, and the facial paralysis had become complete.

Mastoid x-rays, taken by Dr. Marcy Sussman, revealed extensively pneumatized mastoids, with complete destruction of the cells and petrositis on the left.

The patient was taken to the operating room, and after production of general ether anesthesia the left mastoid was exposed through a postauricular incision. The entire cortex had been destroyed, and there was no mastoid tip. There was a cheesy necrotic appearance to the entire operative field. A radical mastoidectomy was done, revealing destruction by the infectious process of the bony wall of the lateral sinus, Trautmann's triangle, and the tegmen. The exposed dura was covered with thick granulations, but there was no evidence of fluctuation. The middle ear, attic, and antrum were filled with granulation tissue, which, when removed, revealed destruction of the supracochlear region and all the bone to the petrous apex. The facial nerve had been destroyed, and only the distal end of it in its descending portion could be identified.

Special stains of the fixed sections of the mastoid bone, prepared by Dr. Donald Bradburn, revealed the presence of tubercle bacilli.

After the mastoidectomy the temperature became more septic in character. On the seventh and eighth hospital days there was a temperature range of 12 degrees. On the seventh day hemoglobin averaged 8.2 gm. per 100 cc., red blood cell count 2,700,000 per cubic millimeter, and white blood cell count 17,050, with 64% neutrophils. On the eighth day hemoglobin averaged

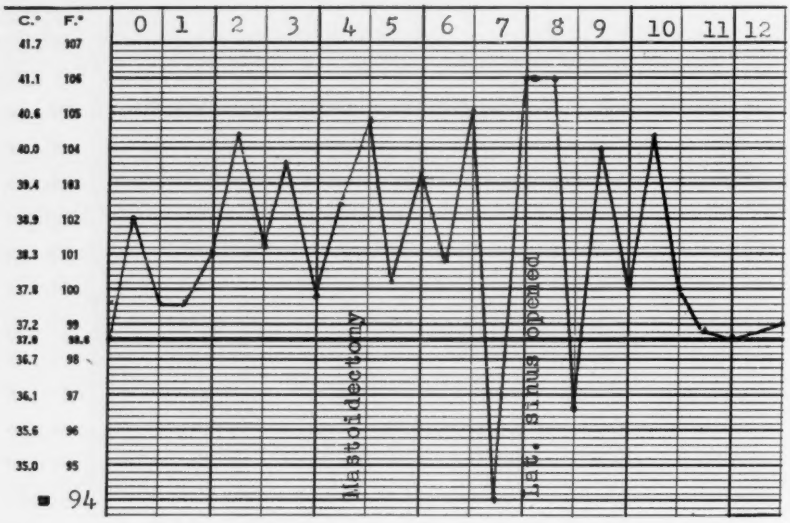
From the Bureau of Indian Affairs; Otolaryngologist for Arizona, Utah, and Nevada.

8.1 gm. per 100 cc. There was slight pitting edema of the feet and ankles. The abdomen was distended, firm, and tender, with marked tenderness over the liver, which was slightly enlarged.

She was taken back to the operating room on the eighth hospital day, and with the patient under general anesthesia the left mastoid wound was reopened. Exposure of the lateral sinus was carried posteriorly until normal-appearing dura was encountered. A 20 gauge needle was inserted into the sinus, and a free flow of blood was obtained. In spite of this result, the sinus was compressed from above and below and then opened, revealing a septic mural thrombus which occluded approximately one-half of the sinus. This was excised, the clot removed, and the sinus packed with iodoform gauze. During the operation 225 cc. of whole blood was given, and this treatment was repeated every other day until a total of 2,000 cc. had been given.

On the 11th hospital day, three days after the lateral sinus had been opened, her temperature was normal, and hemoglobin averaged 10.4 gm. per 100 cc.

The penicillin administration was discontinued, but the streptomycin therapy was continued, with the addition of paraaminosalicylic acid, 6 gm. daily in four divided doses. In spite of this



Temperature chart for the first 12 days (L. J.).

treatment, she began to run an intermittent low-grade fever. Agglutination tests for brucellosis gave negative results. However, blood cultures that had been taken from the lateral sinus during surgery were tentatively reported as positive for Brucella melitensis by the Arizona State laboratory. Unfortunately, the cultures became contaminated, and I was unable to obtain a final report.

She was given a course of chloramphenicol U.S.P. (chloromycetin®), 250 mg. every six hours for two weeks, but she continued to run a low-grade fever.

On the 21st hospital day the packing was removed from the lateral sinus with the patient under ether anesthesia, and at the same time a lymph node was removed from the right axilla. Sections of the gland revealed tubercle bacilli.

In spite of the continued fever, her general condition improved. The abdominal symptoms and the edema of the extremities subsided. There was an increased appetite and a gradual weight gain. However, there was little or no change in the generalized lymphadenopathy, and the bilateral aural discharge continued, in spite of daily cleansing and insufflation of streptomycin powder.

On the 54th hospital day she was taken from the hospital by her parents, against medical advice, and has not been contacted since.

The diagnosis included the following: (1) gonorrheal vulvovaginitis; (2) gonorrheal mastoiditis and petrositis, left; (3) tuberculous mastoiditis and petrositis, left; (4) septic thrombosis of the lateral sinus, left; (5) generalized bovine tuberculosis; (6) tuberculous otitis media, right; (7) brucellosis, unconfirmed.

COMMENT

In this case, as is the case with many of the Indians who do not speak English, little or no emphasis can be placed on the history. It is inconceivable that so many pathologic conditions could have developed in two or three weeks.

The gonococci recovered from the left ear probably represented a secondary infection, transmitted from the vagina and superimposed on a long-standing tuberculous infection, and perhaps was responsible for a rather sudden increase in the symptoms two or three weeks prior to admission.

The abdominal symptoms were attributed to tuberculous peritonitis, although no surgery was done to confirm this diagnosis.

Aside from its unusual character, this case is interesting in that it serves to reemphasize that lateral sinus thrombosis can occur in the presence of antibiotic therapy, although, unlike this case, its symptoms are usually masked by such therapy.

It is worth while noting that lateral sinus thrombosis does not necessarily occlude the entire vessel and that one may get a free flow of blood through a needle in the presence of thrombosis, as was the case in this instance.

Clinical Notes, New Instruments and Techniques

NEW METHOD FOR RELIEVING POSTOPERATIVE PAIN FOLLOWING TONSILLECTOMY

RISDEN T. ALLEN, M.D.
JACKSONVILLE, FLA.

Pain following tonsillectomy is a constant and discouraging feature of the convalescence period. Until recently reliance was placed entirely upon the use of the opiates and salicylates and the ability of the patient to withstand this necessary evil. Not only is pain incapacitating, but it also directly prevents adequate hydration after a period of complete absence of fluids prior to the operation.

Recently this problem was brought to my attention in such a way that I felt I must find some solution more acceptable to the patient than the relief obtained through the use of drugs. A patient that I had tonsillectomized failed to obtain relief of pain through the use of the drugs I prescribed and was advised by his wife to seek advice from the physician who removed her tonsils. This physician employs an acetylsalicylic acid powder which he applies to the fossa and which does relieve pain for a short period. I do not use salicylates after operation, but I felt that I must do something to relieve the pain sufficiently to keep my patients at home, so to speak.

A few days prior to that time I had read an article on the use of "efocaine." It is a clear nonoily water-miscible solution which will produce an anesthesia of approximately 6 to 14 days' duration. "Efocaine" is a solution consisting of the following: procaine, 1%; procaine hydrochloride, 0.25%, and butylaminobenzoate N. F., 5%, in a solvent composed of polyethylene glycol 300, 2%, propylene glycol N. F., 78%, and water. This product is manufactured by E. Fougera & Co., Inc., 75 Varick Street, New York. "Efocaine" had been used successfully for the prevention of postoperative pain following hemorrhoidectomy, and I decided that I would give it a trial. My procedure is as follows:

After routine tonsillectomy or tonsillectomy and adenoidectomy with the use of general anesthesia on patients of all ages I inject 3 cc. of "efocaine" in each fossa by much the same method as for the injection of local anesthetic in tonsillectomy. I inject most of the anesthetic at the base of the fossa, being careful not to inject over 0.5 cc. in any one location. This site was chosen on the theory that much of the pain during post-tonsillectomy deglutition is caused by movement of the tongue. At first I also injected near the uvula, but the latter site was abandoned because of edema of the uvula.

Immediately after the patient reacts and the postoperative nausea passes, one notices that fluids are taken easily. Also, although it is not my practice to give foods the day of operation, most of the patients ask if they may have solids. There is also a decrease in the referred pain to the ears. To date (20 patients, children and adults) there has been no increase in the normal number of postoperative hemorrhages, and not one case of infection or abscess has occurred. Occasionally one does note a slight paralysis of the palate resulting in fluids being regurgitated through the nose, but this reaction has been no more annoying than during the same occurrence when the local anesthetic has not been employed. As for preoperative medication, the normal precautions regarding the use of a local anesthetic have been carried out, i. e., the use of thiopental sodium (pentothal® sodium capsules or suppositories).

I have not been able to determine accurately the exact duration of the anesthesia in days, but the relief of pain obtained during the period when pain is the highlight of the tonsillectomy is sufficient in itself to warrant the use of this drug in the patient undergoing this operation.

1617 San Marco Blvd.

Progress in Otolaryngology

CHRONIC PROGRESSIVE DEAFNESS, INCLUDING OTOSCLEROSIS AND DISEASES OF THE INNER EAR

Summaries of the Bibliographic Material Available in the Field of Otolaryngology for 1950

ARTHUR L. JUERS, M.D.
MIAMI, FLA.
EUGENE L. DERLACKI, M.D.
AND
GEORGE E. SHAMBAUGH Jr., M.D.
CHICAGO

AS IN THE last few years, otosclerosis and its surgical treatment continue to occupy a dominant position in the literature on chronic progressive deafness, with Ménière's disease in second place. The literature also reflects an increasing interest in the etiology and early diagnosis of deafness in very young children.

OTOSCLEROSIS

Anson [1] describes in detail the embryology of the fissula ante fenestram, which lies immediately anterior to the oval window. It contains a chondromatous mass which sometimes is replaced by vascular bone. This histological instability is a circumstance which renders the fissular region subject to pathological change, the vestibular window vulnerable to invasion, and the stapes subject to fixation within its fenestra.

Bast [2] made serial sections of petrous bones obtained at autopsy in 38 cases and studied the structure of the fissular area. Many of the bony changes observed were attempts to rebuild that part of the otic capsule which was left unstable by late fetal cartilage growths, especially in the fissular area. The rebuilding process at the tympanic end of the fissula seemed to form active otosclerotic bone. Blood vessels supplying this part of the capsule are normally found in the tympanic orifice of the fissula, and this fact suggests that, owing to an abnormal or an unstable condition of this area, chemical substances may be liberated which stimulate these localized blood vessels to abnormal activity resulting in otosclerotic new growths.

[Reviewers' Comment: New bone formation in the region of the fissula ante fenestram, first described by Perozzi and now studied in greater detail by Anson and Bast, offers a logical explanation for the occurrence of otosclerotic foci at the site of predilection.]

Guild [3] states that histological otosclerosis is present in one-eighth of all white women and about one-fifteenth of all white men. Only in about one-eighth of the

1. Anson, B. J.: Symposium on Histology and Pathogenesis of Otosclerosis: Fissular Region of the Otic Capsule in Relation to Otosclerosis, Arch. Otolaryng. **52**:843-847 (Dec.) 1950.

2. Bast, T. H.: Postnatal Rebuilding and Otosclerotic Bone Formation in the Region of the Otic Capsule, Arch. Otolaryng. **52**:882-887 (Dec.) 1950.

3. Guild, S. R.: Symposium on Histology and Pathogenesis of Otosclerosis: Incidence, Location and Extent of Otosclerotic Lesions, Arch. Otolaryng. **52**:848-852 (Dec.) 1950.

ears with histologically demonstrable otosclerosis are the location and the extent of the osseous lesion such that impaired hearing results. More than one otosclerotic focus was present in about one-third of the ears studied. Over three-fourths of the ears had a focus immediately in front of the oval window. Not all the growths had caused fixation of the stapes. He points out that not all otosclerosis begins in the fissula ante fenestram.

Lindsay [4] points out that the attempt to link otosclerosis with other general constitutional disorders has so far demonstrated no definite relationship with them either by clinical or by experimental investigation. Hereditary predisposition is evident, and there are indications that otosclerotic activity may in some instances be stimulated by constitutional disturbances, such as pregnancy or chronic inflammatory changes in the ear. Clinically, a definite relationship is evident among blue sclera, fragilitas ossium, or osteogenesis imperfecta, and otosclerosis, suggesting a common hereditary constitutional factor. The endosteal and enchondral layers of the capsule are resistant to most general bone diseases, osteitis deformans and otosclerosis being exceptions.

On the basis of extensive histological studies, Wolff [5] believes that otosclerosis has no specific origin but that it is the result of damage to the peripheral blood supply in the labyrinthine capsule. This might be chemical, vasomotor, or allergic. The ultimate histological changes resulting from this vascular disease will depend on the constitution of the individual patient. In some fibrosis will be prominent, while in others the picture will be that of osteoporosis or hemangioma. Since vascular pathological conditions tend to be symmetrical, the tendency for otosclerosis to be bilateral is accounted for. Vascular disturbances of the inner ear not infrequently accompany the bony changes.

[Reviewers' Comment: The interesting hypothesis advanced by Wolff does not explain the characteristically sharply localized focus of most otosclerotic lesions.]

Fox [6] presents the one-year postoperative results of fenestration surgery performed for otosclerosis in identical female twins. As far as he knew from the literature, an otosclerotic twin had not previously been fenestrated. The operations were performed in August, 1948. The audiograms showed a one-year postoperative level in the speech frequencies of 20 db. in Twin A and 18 db. in Twin B, respective gains of 13 db. and 9 db. over the preoperative levels.

Juers [7] reviews the general aspects of genetics as related to otosclerosis, as well as the cases of 15 sets of identical twins with clinical otosclerosis which have previously been reported by several authors. Two additional cases are reported. In one set with a strong family history of clinical otosclerosis, the progression of otosclerosis was essentially parallel in the two twins. In the other set of twins, there was no family history of clinical otosclerosis, and clinical otosclerosis developed in

4. Lindsay, J. R.: The Influence of Systemic and Local Factors on the Development of Otosclerosis, Arch. Otolaryng. **52**:868-881 (Dec.) 1950.

5. Wolff, D.: Otosclerosis: Hypothesis of Its Origin and Progress, Arch. Otolaryng. **52**:853-867 (Dec.) 1950.

6. Fox, G. M.: Otosclerosis in Identical Twins: Result of Fenestration, South African M. J. **24**:325-327 (May 6) 1950.

7. Juers, A. L.: Otosclerosis in Identical Twins: A Review and Report of 2 Additional Pairs, Ann. Otol. Rhin. & Laryng. **59**:205-214 (March) 1950.

one twin, while the other twin has retained good hearing. In the twin with deafness, the onset was noted during a prolonged illness after delivery. The normal-hearing twin has had several pregnancies, with no effect on her hearing. Routine blood chemistry studies revealed no significant differences in these twins.

Kopetzky [8] did biochemical blood studies on 55 deafened children, of whom 25 were deaf-mutes, with 5 having only residual hearing. The majority were under 10 years of age. All the children exhibited hyperpyruvemia. This deficiency leaves cholinesterase out of control and destroys acetylcholine, the mediator of nerve action along the synapses of the acoustic nerve. This condition deleteriously affects the health of endothelial tissue. This effect in turn permits the second factor at fault in otosclerosis, the hypercholesteremia. The narrowing of the lumen of the blood vessels in the otic capsule results in anoxia and the subsequent otosclerotic changes. The parents of otosclerotic children show similar blood findings, even though no deafness is suspected. Replacement therapy for this condition is to be discussed in a later report.

[Reviewers' Comment: It is difficult to follow the author's deduction that the blood chemical changes found in deafened children lead to otosclerosis, since otosclerosis causes deafness in adults but very rarely in children.]

Lempert [9] makes a critical analysis of the evolutionary development of the fenestration operation, with particular attention to his extensive observations on the problem of osteogenetic closure. He describes his latest technique, which places the fenestra on the top of a mound. To facilitate the formation of an adhesion between the bony margin of the fenestral gap and the skin flap, he invaginates the flap into the fenestra with a specially devised instrument and special cotton inlay packing.

Closure of the surgical fenestra occurred in 22 (14.6%) of 151 cases in which the operation was initially successful.[10] Follow-up varied from six months in a few recent cases to five years in the older ones. The fenestras in three patients under 15 years of age all closed, suggesting that this type of surgery on children be postponed until the age of 15 has been reached. The results obtained in revisions were very unsatisfactory. In 11 revisions, the hearing in the ear was made worse. In view of this fact, revisions are now no longer done.

[Reviewers' Comment: Osseous closure of the fenestra made according to Lempert's original technique occurred frequently by the formation of a bony lid from bone particles remaining in the mouth of the fenestra. By simply freeing the margins of the lid, it could be lifted off, without damage to the endolymphatic duct and with the possibility of a good result. As the technique of the fenestration operation has been perfected, with good endochondralization (doming) and more perfect removal of all bone particles from the fenestral region, osseous closure occurs less frequently. When it does occur, it is generally the result of fibrosis in the perilymph space, with secondary osseous invasion of the fibrous tissue. Removal of the bone

8. Kopetzky, S. J.: A Study of the Deafness Heritage in Otosclerosis, Arch. Otolaryng. **52**:397-418 (Sept.) 1950.

9. Lempert, J.: An Analytical Survey of the Evolutionary Development of the Fenestration Operation, Ann. Otol. Rhin. & Laryng. **59**:988-1019 (Dec.) 1950.

10. Davis, H.; Walsh, T. E., and Eldert, E.: Closure and Revision Following the Fenestration Operation, Laryngoscope **60**:1181-1189 (Dec.) 1950.

and fibrous tissue without damaging the adherent endolymphatic duct is difficult, and, even when successful, it is often followed by re-formation of fibrous tissue and bone. If the fenestra can be extended forward into virgin territory exposing a normal perilymphatic space, there is a better chance of success from the revision.]

Rosen [11] modifies Lempert's cupola technique by using a dental hoe excavator to outline the two streaks over the fenestral site. A curette is used to remove the bone around this area in order to place the fenestral site on top of a mound. A No. 5-0 curette is then introduced into the marginal trench, and the cupola is fractured outward. The chief purpose of this method is to eliminate heat as a factor in osteogenesis.

[Reviewer's Comment: The use of the continuous irrigating apparatus effectively protects the bone against overheating from the burr.]

Popper [12] describes his modified incision, which now closely resembles some versions of the Lempert endaural incision. To create the labyrinthine fenestra, he follows the basic principle of Lempert's cupola technique but uses a small curette as a scoop instead of a knife to incise around the "dome."

Rosen [13] believes that the gradual separation of the tympanomeatal flap as the bony meatal wall is removed with a rongeur results in many undetected bony spicules being buried in the flap. He suggests that the flap be completely separated before any bone work is done. A dull periosteal elevator or an ordinary manicure orange stick with rounded edges is recommended. Flaps removed by both methods on cadavers were x-rayed to provide evidence that the method he suggests eliminates the hazard of bony spicules adhering invisibly to the flap.

[Reviewers' Comment: Tiny particles of bone adherent to the periosteal surface of the flap constitute an important cause for closure, the reviewers agree. An essential step in the fenestration operation is the "toilet of the flap," during which the periosteal surface is minutely examined under magnification and any bone spicules are removed.]

Hall and Millar [14] state their preference for intravenous injection of thiopental (pentothal®) sodium with adequate premedication in fenestration surgery. In addition, to obviate troublesome bleeding in certain cases, the authors use intrathecal injection of 1.5 to 2 cc. of a heavy solution of dibucaine (nupercaine®) hydrochloride, obtaining a planned and controlled hypotension of between 70 and 80 mm. of mercury for about 90 minutes. They feel that this advance in fenestration technique has done more to guarantee a blood-free fenestra than any other method they have observed or employed.

Miodonski and Gans [15] report results in 100 fenestrations, on patients under observation from six months to three years. The basal anesthesia is induced with

11. Rosen, S.: Fenestration by Cold Fracture Method: Preliminary Report of Improved Technics, Arch. Otolaryng. **52**:618-621 (Oct.) 1950.

12. Popper, O.: Transtympanic Technic in Surgical Otology: Transtympanic Postscripts, Arch. Otolaryng. **51**:356-370 (March) 1950.

13. Rosen, S.: Tympanomeatal Membrane in the Fenestration Operation: Its Relation to Bony Closure of Fenestra, Arch. Otolaryng. **52**:930-934 (Dec.) 1950.

14. Hall, I. S., and Millar, A. M.: Hæmostasis in the Fenestration Operation, J. Laryng. & Otol. **64**:233-238 (May) 1950.

15. Miodonski, J., and Gans, H.: Discussion of the Surgical Treatment of Otosclerosis, Acta oto-laryng. **38**:159-166 (April) 1950.

"scophedal" [16] and is supplemented by procaine local anesthesia. Although the incision is directly in the retroauricular fold, the rest of the operative technique described emphasizes endochondralization, continuous irrigation, and formation of the fenestra under a 10.5 × Leitz binocular. An attempt is made to remove a "cupola" in one piece, minimizing trauma to the membranous canal. The authors feel that the immediate postoperative nystagmus is a good indication of injury to the membranous labyrinth, as follows: An uninjured labyrinth produces nystagmus towards the ear operated on, whereas injury to the labyrinth reverses the direction of nystagmus. In 76 (76%) of the cases, there was more than 10 db. of improvement, with a gain of a "full serviceable level of hearing" in 49%. In 11 cases, the improvement gained was lost in two to six months after operation, owing to closure, and in five of eight of these cases, the patients were "efficiently re-operated."

Cawthorne [17] reviews his present fenestration technique and, in general, closely follows that described by Shambaugh. After resection of the head of the malleus, the tendon of the tensor tympani is cut at its insertion into the neck to reduce the chance of troublesome clicking or vertigo on contraction of the tensor tympani after operation. Of 198 cases followed over 18 months, operation was performed in 107 cases in which there were suitable conditions (good cochlear function), resulting in a gain of 11 db. or more in the speech frequencies in 80 cases. The author feels that the Tullio phenomenon is not seen after fenestrations because it may be dependent upon unimpeded round and oval windows.

Shambaugh [18] describes a syndrome of dizziness, tinnitus, and a sense of fulness in the ear, a depression in hearing and pain which occurs not infrequently in a fenestrated ear several months or years after operation. In 703 such cases, the patients were treated with minute doses of histamine according to Hansel's method. In 333 cases, the results of therapy were inconclusive, owing to incomplete records. In 370, the results were definite, the symptoms being improved or relieved immediately or within a few days in 225, or 61%, and not improved in 39%. Pain was more frequently relieved than the other symptoms.

Woods [19] reports further on his bone-conduction observations in cases of otosclerosis in which fenestration has been done. After surgery, there is an improvement in hearing by bone conduction, as determined by audiometry, in most cases. This improvement is noted chiefly in those cases in which there is below normal bone-conduction acuity before surgery. No improvement was noted, unless the air-conduction acuity reached a good level after surgery. In one case in which there was a closure, a return of the bone conduction to the preoperative level occurred. His observations lead him to believe that not all the bone-conduction loss in cases of clinical otosclerosis is due to "secondary cochlear degeneration." Bone conduction in the ears operated on showed an average improvement of 11.4 db. The ears not operated on were used as controls and showed no significant change.

16. "Scophedal" is a solution containing per cubic centimeter 0.5 mg. scopolamine hydrobromide, 10 mg. dihydrohydroxycodeinone hydrochloride, and 25 mg. racephedrine hydrochloride.

17. Cawthorne, T.: The Surgery of Otosclerosis, Proc. Roy. Soc. Med. **43**:491-502 (July) 1950.

18. Shambaugh, G. E., Jr.: Histamine in Treatment of Certain Types of Headache and Vertigo Following the Fenestration Operation, Arch. Otolaryng. **51**:781-785 (June) 1950.

19. Woods, R. R.: Bone Conduction in Otosclerosis, Arch. Otolaryng. **51**:485-499 (April) 1950.

[Reviewers' Comment: The author's observations confirm the original report by Juers that bone-conducted hearing improves, as a rule, after fenestration. Carhart ascribes this improvement to removal by fenestration of a notch in the bone-conduction audiogram that is a mechanical result of stapes ankylosis. Carhart suggests that the bone-conduction audiogram in otosclerosis should be corrected for this notch to determine the true cochlear reserve, an average correction being 5 db. for 512, 10 db. for 1024, and 15 db. for the 2048 frequency.]

Campbell [20] made an extensive study of his fenestration results with respect to preoperative test findings and age of the patient. A small group of patients with a preoperative air-conduction level of 38 db. or less obtained an average improvement of 13.2 db., while another group with a preoperative level of 62 db. or more gained on the average 20.3 db. A group of patients under 26 years of age averaged a 23.5 db. gain, and another group over 45 years of age gained an average of 22.1 db. The average gain for those with normal bone conduction at the 2048 frequency was approximately the same as for those with a 30 db. or more loss at this frequency.

Davis and Walsh [21] point out that after the best possible fenestration there will still be a loss of sensitivity of at least 20 db. by air conduction as compared to normal because the surgically constructed mechanism lacks the normal impedance-matching device of the drum, ossicles, and oval window. Extensive hearing tests were done in 196 consecutive cases in which fenestration surgery was done. The term "surgical deficit" is proposed to designate the number of decibels by which the best result obtained fails to reach what was reasonable to be expected for a particular patient. Allowance must be made for any preexisting nerve deafness component, and the usual 20 db. residual loss is to be anticipated, owing to the absence of ossicles. The complete formula for the surgical deficit is this: Deficit equals (residual air-conduction loss for speech) minus 20 db. minus (residual bone-conduction loss for speech). A detailed analysis of failures is made.

[Reviewers' Comment: The authors present a very interesting concept explaining why the fenestration operation does not restore hearing to normal.]

Kos and Reger [22] state that,

> While there exists a divergence of opinion concerning the reliability of measurements for bone conduction acuity as criteria for selection, there is ample reason to believe that the pre-fenestration bone conduction acuity constitutes an exceedingly significant standard of selection.

Forty-seven consecutive case records were studied, and a correlation was made between preoperative bone-conduction level and postoperative air-conduction threshold. An interesting case report is included involving a patient with conditions deemed suitable for fenestration. At operation, the ossicles were found to be involved in an adhesive process. After the incus and malleus head were removed, the stapes was found to be freely movable. In view of this finding, a fenestration was not carried out, and the tympanomeatal flap was placed in the usual manner to seal off the attic. A good serviceable level of hearing was obtained.

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20. Campbell, E. H.: Evaluation of the Operative Indications and Results in the Fenestration Operation for Otosclerosis, Arch. Otolaryng. **52**:513-532 (Oct.) 1950.

21. Davis, H., and Walsh, T. E.: The Limits of Improvement of Hearing Following the Fenestration Operation, Laryngoscope **60**:273-295 (March) 1950.

22. Kos, C. M., and Reger, S. N.: Selection of Patients for Fenestration Surgery, Arch. Otolaryng. **51**:707-723 (May) 1950.

Saltzman and Ersner [23] found the threshold of feeling lowered in the fenestrated ear, particularly in the 2048 and 4096 frequency zone. It is believed that this condition is due to the absence of any protective mechanism in the newly established physiological process. Acoustic trauma may well account for the deterioration of acuity for high tones in the fenestrated ear seen months or years after the operation. Fenestrated patients working in noisy conditions should wear a suitable ear protector when exposed to loud sounds.

Henner [24] stresses the need for spending sufficient time with the person to be fenestrated to permit adequate evaluation of the emotional and psychic stability before surgery and to prepare the patient for possible failure of the surgery. Psychogenic exaggeration of a hearing loss due to otosclerosis is possible. Cases are cited in detail to illustrate psychosomatic problems encountered in patients having or presumed to have otosclerosis. Discrepancy between speech and pure-tone tests should arouse suspicion of a psychogenic factor. It is important to permit the patient to "talk out" his problems.

[Reviewers' Comment: Psychogenic exaggeration of an otosclerotic hearing loss probably accounts for the occasional patient experiencing a phenomenal hearing improvement in the ear operated on of 50 db. or more and improvement in the ear not operated on. Psychogenic overlay is not common in clinical otosclerosis in the experience of the reviewers.]

Kettel [25] reports the case of a 14-year-old girl who was hard of hearing after bilateral otitis media at the age of 2. The tympanic membranes were normal, and hearing by bone conduction was good. A fenestration was attempted, but there was no lumen in the lateral semicircular canal. There was no labyrinthine response to ice water during surgery. The possibility of this condition being the result of a labyrinthitis ossificans or a labyrinthine aplasia is discussed. Proper preoperative labyrinthine studies would have avoided unnecessary surgery.

[Reviewers' Comment: The author describes a rare condition, not yet encountered by the reviewers in more than 3,000 fenestration operations.]

Hulk and Jongkees [26] studied the vestibular function in 50 cases of untreated otosclerosis, in 30% of which there were complaints of a certain unsteadiness while walking or fits of dizziness after stooping but no typical vertigo. Although the usual vestibular examinations revealed no deviations, cupulometry demonstrated distinct deviations in the vestibular reactions. The typical cupulogram in cases of otosclerosis showed a diminished sensitivity and reactivity for after-turning sensations. The nystagmus graph revealed a diminished sensitivity but an increased reactivity at higher impulses (resulting in a steeper than normal graph).

23. Saltzman, M. and Ersner, M. S.: Threshold of Feeling in the Fenestrated Ear, Arch. Otolaryng. **51**:667-671 (May) 1950.

24. Henner, R.: Psychosomatic Aspects of Surgical Treatment of Otosclerosis, Arch. Otolaryng. **52**:177-187 (Aug.) 1950.

25: Kettel, K.: Attempted Fenestration Operation in a Case of Absence of Lumen of Semicircular Canals, Arch. Otolaryng. **52**:284-287 (Aug.) 1950.

26. Hulk, J., and Jongkees, L. B. W.: Vestibular Examination in Cases of Otosclerosis, J. Laryng. & Otol. **64**:126-130 (March) 1950.

MÉNIÈRE'S SYNDROME

Day [27] presents an excellent summary of the present concepts of the diagnosis and management of Ménière's disease, together with his experience in 220 cases. He believes that in most instances the cochlear symptoms come first and vestibular symptoms do not appear until there is an overflow of endolymph from the distended cochlear duct into the saccule and utricle. In 220 cases, there was deafness but no vertigo in 45, onset of deafness before vertigo in 83, deafness and vertigo noticed together in 83, and vertigo noticed before deafness in 5. There were 27 cases of bilateral involvement, and in 23 of these there was a history of simultaneous involvement of the two labyrinths. In the remaining 4 cases, the elapsed time before involvement of the second ear was 1 year, 3 years, 7 years, and 29 years. A positive history of allergy was obtained in 45 of the 175 cases of typical Ménière's disease and in 23 of the 45 cases without vertigo. The main cochlear symptoms of Ménière's disease are a fluctuating degree of deafness involving the entire scale, decreased bone conduction, low-pitched tinnitus, diplacusis, and hypersensitivity to loud sounds. Attacks of vertigo are usually paroxysmal. Caloric responses uniformly elicit diminished responses from the affected labyrinth. Conservative treatment is most effective if begun early. Operative intervention is indicated in any case of unilateral Ménière's disease in which conservative treatment fails to control the attacks of vertigo and the patient is incapacitated for work. If both ears are involved in this situation, then streptomycin therapy should be considered. Attempting to preserve the hearing in surgery in cases of unilateral involvement is probably not worth while, because the continued tinnitus, over-recruitment, and poor discrimination make the retained hearing a detriment rather than an asset. Relief of vertigo is more complete if cochlear, as well as vestibular, function is destroyed. Of 51 cases in his series in which hearing was destroyed by the initial operation, in all but the two cases of bilateral involvement the patients have been free from acute vertigo attacks and have been rehabilitated.

[Reviewers' Comment: The reviewers subscribe to the author's concepts including a specific allergic origin for certain cases of Ménière's disease. With careful medical management including allergic studies and treatment, surgical destruction of the labyrinth is only rarely required.]

Williams [28] points out that the cardinal sign of Ménière's disease is not the vertigo but rather the inner ear type of deafness, with more involvement for the low tones than the high and usually diplacusis. If this type of hearing loss was found in a patient without vertigo together with a history of rather abrupt onset and a variable, or fluctuating, degree of deafness, a diagnosis of endolymphatic hydrops was considered justified. There was frequently a history of vasomotor disturbances elsewhere in the body. The endolymphatic hydrops is considered to be an extracellular edema involving primarily the scala media of the cochlea. It is believed that the fundamental cause of endolymphatic hydrops is a spastic-atonic condition of the capillaries of the stria vascularis. As a result of this local anoxia, there is a release

27. Day, K. M.: Ménière's Disease: Present Concepts of Diagnosis and Management, Ann. Otol. Rhin. & Laryng. **59**:966-979 (Dec.) 1950.

28. Williams, H. L.; Horton, B. T., and Day, L. A.: Endolymphatic Hydrops Without Vertigo: Its Differential Diagnosis and Treatment, Arch. Otolaryng. **51**:557-581 (April) 1950.

of histamine and increased capillary permeability. The fact that a wide variety of vasodilators give relief would tend to substantiate this concept. The spastic-atonic state is believed to be some form of allergy transmitted by the autonomic nervous system. In women, the association of hearing fluctuations with the menstrual cycle or the menopause suggests the need of appropriate endocrine therapy along with vasodilating therapy.

Of 1,000 cases of perceptive deafness, only about 50 met the criteria established for the diagnosis of endolymphatic hydrops without vertigo. Of these 50 cases, only 32 were selected for the use of treatment with histamine intravenously. In a fair number of these, restoration of hearing up to a useful level was obtained. Better results were obtained in those cases in which the onset of deafness was recent.

[Reviewers' Comment: Comparatively few patients with perceptive deafness without vertigo have conditions suitable for treatment with histamine in the hope of improving the hearing. For the very great majority of patients with perceptive deafness there is no possibility of improving the hearing by treatment of any sort.]

Hilger [29] discusses further the problem of vasomotor labyrinthine ischemia. Nabeya's diagrams of the end circulation to the labyrinth are presented, and the significance of circulatory disturbances to various functional structures is stressed. Pathophysiology is correlated with vasospasm of the internal auditory artery or some of its branches. Therapy should be directed toward release of this vasospasm by intravenous procaine infusion or stellate ganglion block. Ascorbic acid, epinephrine, and nicotinic acid are used as supplementary measures. Dehydration and hypertonic glucose are helpful when endolymphatic hypertension is present. Contributing factors, such as smoking, fatigue, and emotional disturbances, need to be regulated.

Brunner [30] presents his conception of Ménière's disease as a morbid entity, the outstanding symptom of which is the recurrence of Ménière's attacks. Vasomotor labyrinthitis, or transitory hydrolabyrinth, is responsible for typical Ménière's attacks and may resolve without a trace. It may also result in a fixed hydrolabyrinth whose associated degenerative changes of the sensorial organs in the internal ears are responsible for the tinnitus and continuously diminished hearing of Ménière's disease. Brunner repeats his belief that vasomotor labyrinthitis is the result of an increased permeability of the blood vessels of the internal ear. Summary of the pros and cons results in the opinion that the cause of the increased permeability of the blood vessels is not known, although there are several facts in favor of an allergic mechanism.

Kodicek, Taylor, and Bateman [31] discuss their experiences in the treatment of Ménière's disease by the Miles Atkinson method in 53 cases. The cases were divided into 15 "histamine positive" and 38 "histamine negative" cases by the intradermal histamine skin test. The results of treatment in a follow-up of 18 to 30 months were as follows: Vertigo was relieved in 32 cases (60%) and improved in another 20 (38%); tinnitus was relieved in 12 (23%) and improved in 22 (42%); hearing showed an average gain of 10 db. in 10 cases (19%).

29. Hilger, J. A.: Vasomotor Labyrinthine Ischemia, Ann. Otol. Rhin. & Laryng. **59**:1102-1116 (Dec.) 1950.

30. Brunner, H.: Ménière's Attacks and Ménière's Disease (Vasomotor Labyrinthitis), J. Laryng. & Otol. **64**:103-125 (March) 1950.

31. Kodicek, J.; Taylor, L. R. S., and Bateman, G. H.: The Medical Treatment of Ménière's Disease, J. Laryng. & Otol. **64**:647-657 (Oct.) 1950.

Hallpike, in discussing the above paper, could not agree with the value of the histamine skin test as a guide to treatment. Since both histamine and nicotinic acid probably produced an increase of the circulatory rate in the labyrinth, it did not seem to matter very much which was given.

Dintenfass [32] stresses the importance of considering allergy as an etiological factor in lesions of the external, the middle, and the inner ear. A method of dehydration including the use of meralluride U. S. P. (mercuhydrin®) is discussed. He presents a case report of Ménière's syndrome in which this treatment was used to relieve the acute symptoms but in which eventual permanent relief was not obtained until factors of food allergy were discovered.

Atkinson [33] states that the disturbance which produces the characteristic vestibular and cochlear manifestations of Ménière's syndrome is not confined to the ear alone but that there is, in addition, a general disturbance which involves other organs and systems. He enumerates the general symptoms according to systems and according to specific vitamin B fraction deficiencies. Specific findings in the tongue, eyes, mucous membranes, and skin are stressed. Treatment consists of the administration of large doses of the various fractions of vitamin B, the proportion being dependent on the degree of specific deficiencies. The dosage is massive and must be given over a period of years in some instances before a general return to normal metabolism is established. A few interesting cases are cited.

Atkinson [34] reports the use of a new drug, a barbituric acid derivative (mosidal®), for terminating the acute phase of vertigo due to Ménière's syndrome. It was found to be most effective when combined with riboflavin. The majority of patients obtained relief when the drugs were given by mouth. In six patients with refractory conditions, it was given intravenously and produced a narcosis of short duration usually followed by recovery.

[Reviewers' Comment: Current thought is toward a vasomotor disturbance causing Ménière's disease, with a specific allergy to a food or an inhalant responsible for the vascular disturbance in some cases. The management of a patient with this condition in the reviewers' hands consists of an allergic work-up when there are any symptoms suggesting allergy, such as an allergic rhinitis. In a small proportion of cases, a specific allergy to one or more foods, to cigarette smoke, or to house dust seems to be the major factor. More often there is no demonstrable allergic factor, and treatment with a low salt diet and administration of potassium or ammonium chloride to reduce hydration, supplemented by histamine or nicotinic acid therapy, is used. Vitamins other than nicotinic acid do not seem to be important in the treatment of Ménière's syndrome, in the experience of the reviewers. Surgery is reserved for the rare case of unilateral Ménière's disease in which the patient continues to have incapacitating vertigo, the procedure of Cawthorne being used: exposure of the lumen of the osseous horizontal semicircular canal and extraction of the endolymphatic duct.]

32. Dintenfass, A.: Allergy of the Ear: With Classification and New Treatment of Labyrinthine Hydrops by Dehydration, Arch. Otolaryng. **51**:582-595 (April) 1950.

33. Atkinson, M.: Ménière's Syndrome: Observations on Vitamin Deficiency as the Causative Factor; III. The General Disturbance, Arch. Otolaryng. **51**:149-164 (Feb.) 1950.

34. Atkinson. M.: Ménière's Syndrome: A New Drug for Control of the Acute Attack, Arch. Otolaryng. **51**:312-315 (March) 1950.

ACOUSTIC TRAUMA

Schuknecht [35] studied a series of head injury cases with reference to the nerve deafness resulting from such trauma. He found that a longitudinal fracture of the temporal bone is characterized by bleeding from the ear, rupture of the tympanic membrane, and a combined conduction and nerve type of deafness which showed a slight tendency to improve. The conduction component is caused by direct injury of the middle ear structures and is partially or completely reversible. After a transverse fracture, there is severe vertigo with nystagmus to the opposite side, hematotympanum, complete deafness, and total loss of vestibular function in that ear. The fracture line extends through the inner ear, and degeneration of the membranous labyrinth follows. Deafness may also occur in an ear in which there is no clinical or roentgenological evidence of fracture of the temporal bone. The hearing loss is of the nerve type and is severest for the high tones, particularly at the 4096 frequency.

Wilson [36] carried out an experimental study on 250 normal persons to determine their reaction to auditory fatigue. One was exposed to a 2048-cycle fatiguing tone at an intensity of 80 db. for a five-minute period. The threshold for the 4096 frequency was taken at one-half minute and at one minute intervals thereafter and was compared with the threshold found before the fatiguing. All subjects revealed an increase in threshold at the 4096 level. After recovery, the other ear was similarly tested. The return to normal varied from two to eight minutes. If tinnitus developed, it usually subsided as the threshold returned to the prefatiguing level.

Wheeler [37] studied the effects of high-intensity noise on the hearing of normal persons. Synthetic airplane noise produced the usual 4096 dip after 60-minute exposure at 115 db. Exposure to thermal noise resulted in a rather precipitous drop beginning at the 2048 frequency. There was individual variation in the degree of trauma and rapidity of trauma. The desirability of detecting acoustic-trauma-susceptible persons in industry is discussed.

[Reviewers' Comment: A simple practical test for susceptibility to acoustic trauma is badly needed by industry for noise-deafness prevention programs.]

MISCELLANEOUS

Lederer [38] states that modern concepts of radiation therapy for pharyngeal and nasopharyngeal tissue are essentially those which he presented in 1922. He believes that it is impossible to disassociate the mucous membranes of the pharynx, sinuses, Eustachian tube, and middle ear from one another. He describes two techniques for x-ray therapy. One includes the entire sinus and pharyngeal area, and the other includes only the pharynx. He stresses that irradiation is not a substitute for surgery and that allergy and other manifestations of respiratory membrane disease must receive adequate attention.

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35. Schuknecht, H. F.: A Clinical Study of Auditory Damage Following Blows to the Head, Ann. Otol. Rhin. & Laryng. **59**:331-358 (June) 1950.

36. Wilson, W. H.: Determination of Susceptibility to Abnormal Auditory Fatigue, Ann. Otol. Rhin. & Laryng. **59**:399-405 (June) 1950.

37. Wheeler, D. E.: Noise-Induced Hearing Loss, Arch. Otolaryng. **51**:344-355 (March) 1950.

38. Lederer, F. L.: Evaluation of Irradiation of Pharyngeal and Nasopharyngeal Lymphoid Tissue, Ann. Otol. Rhin. & Laryng. **59**:102-111 (March) 1950.

Bilchick and Kolar [39] review their experience with radium therapy for lymphoid tissue in the nasopharynx. In 48 cases of conduction deafness, a substantial improvement was obtained in 37. In general, tinnitus and recurrently discharging ears were not benefited. Except in cases in which marked initial hypertrophy was presented, visible decrease in lymphoid tissue was equivocal in most cases, for residual small amounts were commonly seen. It is their opinion that x-ray therapy is preferable when the lymphoid tissue extends beyond the Eustachian tube orifice. They caution that radium therapy should not become a routine substitute for other effective means of therapy in ear conditions. Proper management of sinusitis and allergy and adequate surgical removal of lymphoid tissue must not be overlooked.

[Reviewers' Comment: The reviewers believe that radiation therapy for deafness has been greatly overdone: Patients have been irradiated who would have been better treated by surgical adenoidectomy; many have been irradiated when allergic management would have given as good or better results; patients with irreversible nerve deafness or otosclerosis have been irradiated without any evidence of tubal occlusion.]

The clinical association of moderate bilateral perceptive deafness, athetoid cerebral palsy, and a history of erythroblastosis has been observed by Goodhill [40] during the otologic study of 101 children with cerebral palsy. Of these, 41 had athetosis, of whom 13 showed significant hearing impairments. Eleven of the 13 children with athetosis had definite histories of erythroblastosis, with sufficient serologic evidence to substantiate the diagnosis. Convincing evidence is presented which tentatively localizes the deafness in erythroblastotic kernicterus to the nuclear masses of the brain and the brain stem. In addition to eight case histories typical of the clinical triad already mentioned, three more case reports are presented from a group of cases of perceptive deafness in children, with histories and serologic findings supporting a presumptive diagnosis of erythroblastosis but with no spasticity or athetosis. The author concludes that "the Rh factor thus begins to play a role as a potential cause of some cases of infantile nerve deafness."

In an analysis of 904 questionnaires addressed to the mothers of profoundly deafened children, Goodhill [41] found that the potential cause of deafness in 186 children (20.5%) was maternal rubella in the first three months of pregnancy.

Crabtree and Gerrard [42] report the results of examination in 20 cases of kernicterus with hearing impairment. In 16 of the cases, a perceptive deafness, usually of the high-tone type, was found; in 3 cases, there was a conduction deafness, and in 1 case, there was nearly normal hearing. The severity of the deafness did not seem to bear any direct relationship to the level of intelligence or to the severity of other disabilities, such as chorea. In 14 of the 16 cases of perceptive deafness associated with kernicterus, there had been jaundice due to Rh isoimmunization.

39. Bilchick, E. B., and Kolar, A. R.: Radium Therapy for Lymphoid Tissue in the Nasopharynx, Ann. Otol. Rhin. & Laryng. **59**:78-89 (March) 1950.

40. Goodhill, V.: Nuclear Deafness and the Nerve Deaf Child: The Importance of the Rh Factor, Tr. Am. Acad. Ophth. **54**:671-687 (July-Aug.) 1950.

41. Goodhill, V.: The Nerve-Deaf Child: Significance of Rh, Maternal Rubella and Other Etiologic Factors, Ann. Otol. Rhin. & Laryng. **59**:1123-1147 (Dec.) 1950.

42. Crabtree, N., and Gerrard, J.: Perceptive Deafness Associated with Severe Neonatal Jaundice: Report of 16 Cases, J. Laryng. & Otol. **64**:482-506 (Aug.) 1950.

Barnett and Ryder [43] report a case of kernicterus associated with erythroblastosis fetalis. At 14 months of age, the infant showed evidence of general retardation and no evidence of response to sound.

Lindsay and Zuidema [44] report 16 cases of inner ear deafness of sudden onset which cannot be attributed to such well-known causes as suppurative labyrinthitis, tumors, inner ear trauma, or known toxic involvement. The sudden permanent nature of the impairment was thought to differentiate these cases from hydrops of the labyrinth. Four cases were seemingly associated with systemic disease. A toxic neuritis would provide a favorable explanation for the 12 cases of indefinite origin and must be seriously entertained. In three of these cases there was a specific syndrome of bilateral inner ear dysfunction associated with an inflammatory ocular disturbance.

Fowler [45] discusses the possible etiological factors concerned in 26 cases of sudden nerve deafness. The deafness was unilateral in 20 cases and bilateral in 6. Tinnitus was present in 20 and absent in 6. The static labyrinths showed a reduced or no response on one or both sides in 21 cases. With three exceptions, there was a history of emotional episodes sometime before or immediately preceding the sudden deafness. Five patients were examined for sludging of blood in the conjunctival capillaries, and all showed this phenomenon. He believes that vascular contraction, sludging, and eventually congestion, edema, anoxia, leakage from capillaries, and local metabolic deficiencies may be, and frequently are, the cause of sudden deafness. He suggests that procaine be used intravenously as an antisludging agent.

Guild [46] reports in detail the records of four children with high-tone deafness. They were first seen incidental to a hearing survey in Baltimore. Radiation therapy to the nasopharynx was carried out, but the loss progressed. No definite cause could be determined. The final hearing test was similar to what is frequently seen as a result of acoustic trauma or a congenital defect. Neither of these etiological factors applied in these cases.

Dix and Hallpike [47] attempt to explain the presence of a "true negative Rinne" in the tuning fork tests of unilateral deafness in two cases of eighth nerve neuroma, instead of the usual, or classical, positive Rinne test of nerve deafness. The authors feel that they exclude a false negative Rinne test by masking the good ear by means of a speaking tube through which an assistant applies to the right ear a continuous "sh-sh-ing" sound. Pathological examination of the temporal bones in the two patients, who died after surgical intervention, revealed a fine homogeneous "coagulum" completely filling all the perilymph and endolymph spaces of the labyrinth. This coagulum was seen during the cutting of the celloidin embedded specimens and in the sections without staining and with dark-ground illumination. Sections

43. Barnett, R. N., and Ryder, C. F.: Deafness and Kernicterus, Arch. Otolaryng. **52**:771-772 (Nov.) 1950.

44. Lindsay, J. R., and Zuidema, J. J.: Inner Ear Deafness of Sudden Onset, Laryngoscope **60**:238-263 (March) 1950.

45. Fowler, E. P.: Sudden Deafness, Ann. Otol. Rhin. & Laryng. **59**:980-987 (Dec.) 1950.

46. Guild, S. R.: The Progression of Impaired Hearing for High Tones During Childhood, Laryngoscope **60**:885-911 (Sept.) 1950.

47. Dix, M .R., and Hallpike, C. S.: Observations on the Pathological Mechanism of Conductive Deafness in Certain Cases of Neuroma of the Eighth Nerve, J. Laryng. & Otol. **64**:658-666 (Oct.) 1950.

cut and stained with hematoxylin and eosin revealed no sign of the coagulum. The authors conclude that this abnormal histological appearance of the labyrinthine fluid connotes the existence during life, if not of an actual coagulum, at least of some considerable change of its density. This density change brings about a mechanical change in this terminal component of the conductive mechanism which disturbs its performance as a whole in a manner essentially comparable to that brought about by better-known lesions of its other components.

Hallpike and Harrison [48] report the clinicopathological findings in a case of a 43-year-old woman with leukemia of the internal ear. Clinically, a sketchy examination of a severely ill patient revealed a mild bilateral hearing impairment, and a "vestibular" nystagmus was present both to the right and to the left, being more marked to the right. There was a severe rotary vertigo present. Histological examination revealed a remarkable symmetry of pathological findings in the two labyrinths. There were a few leukemic cells lying loose in the scala vestibuli of the cochlea, which was otherwise relatively well preserved. In the vestibule and the external canal, however, the perilymph spaces were densely packed with leukemic cells, and the subepithelial tissue of the macula retriculi and the ampulla of the external canal were also infiltrated.

Love [49] reports a case of a 16-year-old girl with unilateral deafness present for eight years and a subsequent progressive facial palsy without cerebellar signs, which, on surgery, was found to be due to a neurofibroma completely enclosed within the petrous bone. The author states that these findings are unique in his experience.

Kopetzky [50] presents a study of 581 cases of deafness of all types, both conductive and perceptive, which demonstrate the wide range of bodily diseases and dysfunctions from which deafness, tinnitus, and vertigo originate. The clinical cases described all stress hypercholesteremia and hyperpyruvemia as the blood chemistry findings indicative of biochemical physiologic dysfunction at fault in the cases of cochlear and vestibular dysfunction. Thus, the author's method of therapy is directed towards overcoming hyperpyruvemia (deficiency in thiamine) with the administration of large doses of thiamine and vitamin B complex, with resultant improvement in faulty carbohydrate metabolism. This aids fat metabolism, and, in addition, lipotropic factors, such as choline, methionine, and inositol, are given in large daily doses to reduce the excess of cholesterol in the blood and to remove the lipoid deposits in the endothelial linings of arteries. The administration of thyroid extract, anterior pituitary extract, and histamine as adjuvant therapy to correct contributory endocrinopathies is mentioned.

Jordan [51] discusses allergy as an etiological factor in deafness. Allergy was found to be the cause in 85% of 164 consecutive cases of chronic secretory otitis media. In a few of these cases, an attic retraction and perforation as a result of a membranous partition separating the attic from the middle ear cavity developed in the

48. Hallpike, C. S., and Harrison, M. S.: Clinical and Pathological Observations of a Case of Leukemia with Deafness and Vertigo, J. Laryng. & Otol. **64**:427-430 (July) 1950.

49. Love, J. G.: Unilateral Deafness and Progressive Facial Palsy Due to Intrapetrous Neurofibroma: Surgical Treatment, Proc. Staff Meet., Mayo Clin. **25**:228-232 (April) 1950.

50. Kopetzky, S. J.: Reversal of Biochemical Processes in Cases of Cochlear and Vestibular Dysfunction, J. Internat. Coll. Surgeons **13**:139-171 (Feb.) 1950.

51. Jordan, R. E.: Deafness Due to Allergy, Laryngoscope **60**:152-160 (Feb.) 1950.

patient. He believes that this mechanism is a common one in the genesis of attic cholesteatoma. Persistent drainage from a fenestration cavity or a radical mastoid cavity is in many instances due to allergy. In many cases of Ménière's disease, allergy seems to be an etiological factor. A combination of allergic management and histamine desensitization is effective in many instances. A few instances of tinnitus due to allergy are cited.

[Reviewers' Comment: The frequency of a specific allergic origin for chronic secretory otitis media, for some cases of attic cholesteatoma, and for some cases of Ménière's disease, as described by the author, coincides with the experiences of the reviewers. The best results in the treatment of deafness due to allergy will be obtained by the otologist who makes his own allergic diagnosis and carries out treatment.]

Chang, Margaria, and Gelfan [52] studied the effects of decompression and recompression on the middle ear experimentally on monkeys. In the course of slow decompression, the Eustachian tube opened periodically to keep the tympanic pressure close to ambient pressure. This reaction occurred in both anesthetized and unanesthetized animals. During recompression, anesthetized monkeys could not equalize the tympanic and ambient pressures, and a negative pressure developed in the middle ear. Unanesthetized monkeys were able to equalize the tympanic and ambient pressures by active opening of the Eustachian tube, unless the rate of recompression was too rapid. When the negative pressure developed up to a value of about 300 mm., severe mastoid and tympanic hemorrhage would occur. Myringopuncture prevented the development of negative pressure, and no barotrauma resulted.

Asherson [53] demonstrates the value of a small wool insert steeped in liquid paraffin and hard petrolatum, whose melting point is such that it sets firmly at body temperature, in certain cases of deafness resulting from healed chronic otorrhea. The insert is applied to the region of the round window in dry and healed radical mastoid cavities or in ears with large permanent dry central perforations of the tympanic membrane. The resulting improvement may be anything from 20 to 30 db. for the entire hearing frequencies, with elevation of the hearing into the practical range, as shown in a number of illustrative audiograms. In a willing, cooperative patient who learns to make occasional necessary adjustments in the placement of the insert, it may be left in situ for weeks and months.

Jongkees and Groen [54] describe the false impression of a preserved function of the otolithic apparatus by routine qualitative examinations (hearing of low tones below 500 cps and a capability to perceive linear accelerations) in a 12-year-old girl with loss of function of both inner ears from cerebrospinal meningitis. The perception of linear acceleration was explained by the stimulation of the skin and deeper sensitive sense. However, quantitative testing by the parallel swing, the position chair, and the rotating chair showed the complete loss of linear sense in the otolithic organs.

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52. Chang, H. T.; Margaria, R., and Gelfan, S.: Pressure Changes and Barotrauma Resulting from Decompression and Recompression in the Middle Ear of Monkeys, Arch. Otolaryng. **51**:378-399 (March) 1950.

53. Asherson, N.: Deafness Due to Chronic Otorrhea: Alleviated by Tympanic Insert, J. Laryng. & Otol. **64**:239-248 (May) 1950.

54. Jongkees, L. B. W., and Groen, J. J.: A Quantitative Analysis of the Reactions of a Person After Loss of the Function of Both Inner Ears, J. Laryng. & Otol. **64**:135-140 (March) 1950.

Burn [55] reports on two new families with the Laurence-Moon-Biedl syndrome. The main components of the syndrome are obesity, hypogenitalism, polydactylism, ocular defects, of which the most usual type is some variant of the classical picture of retinitis pigmentosa, and mental deficiency. A review of the literature of the syndrome as a whole, including all case reports mentioning deafness published since 1864, reveals that the incidence of congenital deaf-mutism in persons with Laurence-Moon-Biedl syndrome and their siblings is 30 times as high as in the general population. The scanty postmortem evidence there is points to a pituitary abnormality, with an excess of basophile and eosinophile cells in the anterior lobe.

Donald and Gardner [56] report on a case of nonsyphilitic interstitial keratitis with vestibuloauditory symptoms which progressed to complete loss of auditory and vestibular function bilaterally. Cultures on various media and animal inoculations of the ocular exudate, spinal fluid, and emulsified superior cervical sympathetic ganglion failed to show that the disease was communicable. Bilateral superior cervical ganglionectomy was followed by a decrease in photophobia and lacrimation and the ability to hear loud noises. The authors paradoxically evaluate the postoperative course as no "demonstrable improvement" in their summary.

[Reviewers' Comment: This is the syndrome first described by Cogan and sometimes called "Cogan's syndrome." In one case studied by the reviewers an allergy to egg seemed to be the possible cause.]

Robson [57] records the "eleventh known" case of nonsyphilitic interstitial keratitis and vestibuloauditory symptoms. At the patient's insistence, a bilateral cervical thoracic sympathectomy was performed by another physician, without any benefit.

Altmann [58] has made a very comprehensive review of the literature on inherited nerve deafness and reports in detail the histological findings in two cases. In summary, he states the following:

> In the great majority of the cases of inherited deafness changes are seen in the organ of Corti, the stria vascularis and, to a much lesser extent, in the cochlear nerve fibers and the spiral ganglion cells of the basal portion of the cochlea. In addition, a degenerative atrophy of the macula sacculi is often observed in man. . . . The primary acoustic nuclei and the central acoustic pathways are normal in some and atrophic in other instances. The utricle and the semicircular canals are always free from changes. . . .
>
> In all cases of inherited deafness a recessive hereditary trait is present. . . .
>
> The anatomic changes underlying the large group of cases with progressive deafness, abnormal fatigability and susceptibility to wear and tear and to acoustic traumas with premature presbycusis and similar conditions are not definitely known. They are, however, most probably different from those in the preceding cases and seem to consist primarily in degenerative changes in the cells of the spiral ganglion, particularly in the lower parts, on the basis of an inherited "localized organic weakness of the cochlear system," as expressed by Streeter. The hereditary trait is dominant in some instances but undetermined in the majority of them.

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55. Burn, R. A.: Deafness and the Laurence-Moon-Biedl Syndrome, Brit. J. Ophth. **34**:65-88 (Feb.) 1950.

56. Donald, R. A., and Gardner, W. J.: Keratitis with Deafness, Am. J. Ophth. **33**:889-892 (June) 1950.

57. Robson, J. T.: Cervical Sympathectomy in Nonsyphilitic Interstitial Keratitis with Vestibuloauditory Symptoms, Arch. Ophth. **44**:243-244 (Aug.) 1950.

58. Altmann, F.: Histologic Picture of Inherited Nerve Deafness in Man and Animals, Arch. Otolaryng. **51**:852-890 (June) 1950.

Kinney [59] presents a practical classification of congenital deafness based on etiology. He stresses the need for more histopathological studies. In 186 cases of bilateral congenital deafness there was residual hearing in approximately 20%, but this was invariably at the 500 cps level or lower.

Lempert [60] discusses hearing conservation by the avoidance of damage to a normally functioning hearing organ, by the improvement of already existing impairment and by maintaining this improvement, and by conserving the level of impaired hearing through prevention of further impairment when improvement is impossible. The successful fenestration operation is an important example of maintained improvement of previously impaired hearing function. The author feels that evidence exists for the prevention of secondary cochlear degeneration in a successfully performed fenestration. An important hearing conservation measure is the performance of mastoidoatticotomy (modified radical mastoidectomy) rather than frequently unnecessary mastoidotympanectomy. Considerable evidence is advanced that the use of the electric hearing aid can adversely affect the attempt to conserve the level of impaired cochlear nerve function, since "the hearing aid as constructed, manufactured and fitted today can result in overstimulation with sound and cause cochlear nerve function damage."

[Reviewers' Comment: The author's statement that successful fenestration may prevent secondary cochlear degeneration in otosclerosis coincides with the experience of the reviewers. After a few more years, it should become possible to prove or disprove this statement positively by comparing the cochlear function in the ear operated on and the one not operated on in a large number of patients on whom fenestration was done 10 to 15 years earlier. The evidence thus far accumulated favors the idea that the fenestrated ear maintains good cochlear function better and longer than the opposite unfenestrated ear in the same patient.

The author's emphasis on the modified (Bondy) type of radical mastoidectomy to preserve the hearing is well taken.]

Curry [61] studied the results of testing the hearing by pure-frequency audiometry of all school children in the fifth, seventh, and ninth grades in two rural central Illinois counties. The statistical analysis revealed that the percentage of occurrence of hearing loss (defined as a failure to respond to one or more tones as loud as 30 db.) for the total group was 12.8. The percentage for boys was 15.29 and for girls, 10.1. Monaural loss occurred more often than binaural loss.

Halloran [62] reviews the more recent literature on deafness in children with emphasis on postrubella deafness and psychogenic deafness. He concludes that among deaf children there is a great scope for the psychologists' ministrations and research. Early diagnosis of deafness is stressed in order that an educational program may be considered. The salient features of American and English schools for the deaf are summarized.

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59. Kinney, C. E.: The Pathology of Hereditary Deafness, Ann. Otol. Rhin. & Laryng. **59**:1117-1122 (Dec.) 1950.

60. Lempert, J.: Conservation of Hearing Function, Tr. Am. Acad. Ophth. **54**:713-722 (July-Aug.) 1950.

61. Curry, E. T.: An Analysis of Hearing Loss Patterns in a Rural Illinois School System: General Considerations, Eye, Ear, Nose & Throat Month. **29**:357-359 (July) 1950.

62. Halloran, G. R.: Recent Advances in the Management of Deafness in Children, M. J. Australia **2**:289-293 (Aug.) 1950.

[Reviewers' Comment: Psychogenic (emotional) deafness in very young children may prove to be more frequent than we have suspected. The child psychologist trained in hearing problems is needed to diagnose and treat these conditions.]

Martin [63] discusses the major public health problem of detection and care of the hard of hearing child. The ideal program would provide for audiometric testing annually and at any time a school child has had a communicable disease. Case finding leads to adequate medical management of remedial deafness and to correct evaluation of nonremedial deafness cases in order that a proper program of rehabilitation may be instituted.

Bakwin [64] reviews the literature pertinent to a comprehensive study of deaf and hard of hearing children. Comparisons between these children and the normal-hearing child are made in studies of intelligence, language functions, school progress, personality patterns, and special abilities. In the care of the deaf child, the author emphasizes, as do most writers on the subject, the clues to early recognition of deafness in order to initiate the preschool program as soon as possible. Frequently the key to a successful training program is help for the child in socialization, which is a primary need for optimum personality development.

63. Martin, J. D.: The Public Health Aspects of Decreased Hearing in Children, New Orleans M. & S. J. **102**:575-580 (May) 1950.

64. Bakwin, R. M.: The Deaf Child, J. Pediat. **36**:668-682 (May) 1950.

Special Reports

HEARING AIDS ACCEPTED BY THE COUNCIL ON PHYSICAL MEDICINE AND REHABILITATION OF THE AMERICAN MEDICAL ASSOCIATION

AS OF JAN. 1, 1953

Audicon Models 400 & 415
Mfr., National Earphone Co., Inc.
20 Shipman St.
Newark 2, N. J.

Audiotone Model 11
Mfr., Audio Company of America
5305 N. Sixth St.
Phoenix, Ariz.

Audivox Model Super 67
Mfr., Audivox, Inc.—Successor to Western Electric Hearing Aid Division
123 Worcester St.
Boston 18

Aurex Models L & M
Mfr., Aurex Corporation
1117 N. Franklin St.
Chicago 10

Beltone Mono-Pac Model M

Beltone Symphonette Model
Mfr., Beltone Hearing Aid Co.
1450 W. 19th St.
Chicago 8

Cleartone Models 500 & 700

Cleartone Regency Model
Mfr., American Sound Products, Inc.
1303 S. Michigan Ave.
Chicago 5

Dahlberg Model D-1

Dahlberg Junior Model D-2

Dahlberg Model D-3

Dahlberg Model D-4
Mfr., The Dahlberg Company
Golden Valley
Minneapolis 22

Dysonic Model 1
Mfr., Dynamic Hearing Aids, Inc.
149 Church St.
New York 7

Electroear Model C
Mfr., American Earphone Co., Inc.
10 E. 43rd St.
New York 17

Gem Models V-35 & V-60
Mfr., The Gem Ear Phone Co., Inc.
50 W. 29th St.
New York 1

Goldentone Models 25, 69 & 97
Mfr., Johnston Hearing Aid Mfg. Co.
708 W. 40th St.
Minneapolis 8

Distr., Goldentone Corporation
708 W. 40th St.
Minneapolis 8

Maico Model J

Maico Quiet Ear Models G & H

Maico UE Atomeer
Mfr., The Maico Company, Inc.
21 N. 3rd St.
Minneapolis 1

1947-Mears Aurophone Model 98

Mears (Crystal & Magnetic) Aurophone Model 200
Mfr., Mears Radio Hearing Device Corporation
1 W. 34th St.
New York 1

Micronic Model 303

Micronic Model Mercury

Micronic Star Model
Mfr., Audivox, Inc.—Successor to Western Electric Hearing Aid Division
123 Worcester St.
Boston 18

Microtone Audiomatic T-5

Microtone Classic Model T-9

Microtone Models T-10, T-612 & 45
Mfr., The Microtone Company
Ford Parkway on the Mississippi
St. Paul 1

National Cub Model (C)

National Model D (Duplex)

National Standard Model (T)

National Star Model (S)

National Ultrathin Model 504

National Vanity Model 506
Mfr., National Hearing Aid Laboratories
106 S. 7th St.
Philadelphia 6

Normatone Model C
Mfr., Johnston Hearing Aid Mfg. Co.
708 W. 40th St.
Minneapolis 8
Distr., Normatone Hearing Aid Co.

Otarion Model E-4

Otarion Models F-1, F-2 & F-3

Otarion Models G-2 & G-3
Mfr., Otarion, Inc.
4757 N. Ravenswood Ave.
Chicago 40

Paravox Model D Top-Twin-Tone

Paravox Model J (Tiny-Myte)

Paravox Model XTS ('Xtra-Thin)

Paravox Model Y (YM, YC & YC-7) (Veri-Small)
Mfr., Paravox, Inc.
2056 E. 4th St.
Cleveland 15

Radioear All-Magnetic Model 55

Radioear Model 62 Starlet

Radioear Model 72

Radioear Permo-Magnetic (Multipower)

Radioear Permo-Magnetic (Uniphone)
Mfr., E. A. Myers & Sons, Inc.
306 Beverly Rd.
Mount Lebanon
Pittsburgh 16
Distr., Radioear Corporation

Rochester Model R-1

Rochester Model R-2
Mfr., Rochester Acoustical Laboratories, Inc.
117 Fourth St., S. W.
Rochester, Minn.

Silvertone Model J-92

Silvertone Model P-15
Mfr., Johnston Hearing Aid Mfg. Company
708 W. 40th St.
Minneapolis 8

Distr., Sears, Roebuck and Co.
925 S. Homan Ave.
Chicago 7

Solo-Pak Model 99
Mfr., Solo-Pak Electronics Corp.
Linden St.
Reading, Mass.

Sonotone Model 900

Sonotone Models 910 & 920

Sonotone Model 925

Sonotone Model 940

Sonotone Model 966
Mfr., Sonotone Corporation
Elmsford, N. Y.

Super-Fonic Hearing Aid
Mfr., American Sound Products, Inc.
1303 S. Michigan Ave.
Chicago 5

Televox Model E
Mfr., Televox Mfg. Company
1307 Sansom St.
Philadelphia 7

Telex Model 97

Telex Model 99

Telex Model 200

Telex Model 300-B

Telex Model 400

Telex Model 500

Telex Model 952

Telex Model 1700
Mfr., Telex, Inc.
Telex Park
St. Paul 1

Tonamic Model 50
Mfr., Tonamic, Inc.
12 Russell St.
Everett 49, Mass.

Tonemaster Cameo Model

Tonemaster Model Royal
Mfr., Tonemaster, Inc.
400 S. Washington St.
Peoria 2, Ill.

Unex Midget Model 95

Unex Midget Model 110

Unex Models 200 & 230
Mfr., Nichols & Clark
Hathorne, Mass.

Vacolite Models J & J-2
Mfr., Vacolite Company
3003 N. Henderson St.
Dallas 6, Texas

Western Electric Models 65 & 66
Mfr., Audivox, Inc.—Successor to Western Electric Hearing Aid Division
123 Worcester St.
Boston 18

Zenith Miniature 75

Zenith Model Royal

Zenith Model Super-Royal
Mfr., Zenith Radio Corporation
5801 W. Dickens Ave.
Chicago 39

(All the accepted hearing devices have vacuum tubes.)

Accepted hearing aids more than five years old have been omitted from this list for brevity.

TABLE HEARING AIDS

Ambco Hearing Amplifier (Table Model)
Mfr., A. N. Brooks Company
684 S. Bonnie Brae St.
Los Angeles 5

Aurex Semi-Portable
Mfr., Aurex Corporation
1117 N. Franklin St.
Chicago 10

Precision Table Hearing Aid
Mfr., Precision Hearing Aids
5157 W. Grand Ave.
Chicago 39

Sonotone Professional Table Set Model 50
Mfr., Sonotone Corporation
Elmsford, N. Y.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Sherman L. Shapiro, M.D., *President*

Lawrence J. Lawson, M.D., *Secretary*

Monthly Meeting, April 2, 1951

The Adult and His Hearing Problem. Dr. Francis L. Lederer and Dr. Richard E. Marcus.

The need for study of the person who seeks aid for the amelioration or cure of his hearing deficit is emphasized. When such measures as inflations of the middle ear, submucous resection of the nasal septum, tonsil and adenoid operations, radium applications, and various medicaments have failed, all too often the patient has been shunted on his way to fend for himself. The modern approach to the problem calls for bringing to the patient the advantage of the latest procedures. These include intelligibility testing to determine the extent of word discrimination possessed by the patient and to evaluate the improvement in discrimination made possible with amplification in the presence of standardized noise.

The selection and evaluation of hearing aids involves an inventory of all tests, such as voice test, tuning-fork tests, pure-tone audiometry, speech-reception tests, and trial of a number of hearing aids under the same environmental conditions. No hearing aid restores normal hearing; it is at best an aid. The patient is taught as a hard of hearing person who wears a hearing aid, not as a normal person having to wear an aid. He receives a hearing aid selected under objective conditions in a sound-treated room and with his personal ear mold. A course in auditory education is given preparatory to actual selection of the aid. He is conditioned in development of tolerance for amplified sound, and receives some instruction in speech, reading and use of auditory clues, and instructions in methods of practice at home. He receives a psychologic survey, more detailed at the psychiatric center if necessary. For vocational and educational considerations in acquiring new skills, he is directed to local or state agencies concerned with the necessary type of counseling.

It is necessary for the otolaryngologist to be educated in these procedures. Such education may be obtained at several rehabilitation centers in various university clinics, where young otolaryngologists in training are already finding instruction available in clinical rehabilitation and its related basic science, audiology. In the larger metropolitan areas, hearing centers for clinical rehabilitation already exist, to which patients may be sent for retraining, hearing-aid selection, counseling, etc. The family and the community have failed to answer the needs of the deaf and the hard of hearing: the family through lack of understanding, and the community through failing to realize the seriousness of the economic load of improperly educated and trained members of its group. The physician may likewise be remiss in his duties if he fails to arouse the family and the community to the needs of hard of hearing persons.

Management of Laryngeal Carcinoma. Dr. Albert H. Andrews and Dr. William Kucera.

During a three-year period 71 patients (67 males and 4 females) having laryngeal carcinoma proved by biopsy have been observed. The methods of curative treatment used and the results are presented. The principles governing selection of treatment were the following.

Laryngofissure: Small, early, squamous cell carcinoma limited to one vocal cord, without involvement of the anterior commissure or the tip of the vocal process, normal cricoarytenoid motility, and movable vocal cord are considered the important criteria.

Laryngectomy: Carcinoma involving areas of the larynx other than the vocal cord, involving more than one vocal cord, cricoarytenoid fixation, or vocal cord fixation are the important criteria.

Laryngectomy plus Radical Neck Dissection: Same criteria as above, plus involvement of the cervical lymph nodes.

Radiation Therapy: Carcinoma extending out of the larynx into the pharynx on trachea beyond the point of reasonable resection or into the soft tissues around the larynx; when surgery has been refused or when contraindicated because of the patient's general condition.

Intralaryngeal Removal (not performed): Small squamous cell carcinoma limited to such a size that it may be removed in one piece by forceps and with normal cordal and cricoarytenoid motility.

Hemilaryngectomy (not performed): Squamous cell carcinoma of one vocal cord not involving the anterior commissure, with minimal extension into the ventricle or with extension onto the vocal process of the arytenoid are the important criteria.

The conventional technics were used in this surgery, with certain modifications in some procedures. Inasmuch as the survey covers a period of three years, results as to cure cannot be presented adequately. There have been recurrences in 7 patients, and 23 patients have died as a result of the carcinoma, recurrence, or conditions secondary to recurrence. At present there is no evidence of disease in 34 patients.

After laryngofissure, the voice in all instances has been reasonably good. Two patients developed excellent voices, and it is difficult to recognize any abnormality in ordinary conversation. The development of buccoesophageal voice after laryngectomy has been variable. In charity patients the results have generally been poor. In private patients the contrary is true. The cooperation between the bronchoesophagology and speech and hearing services indicates need for more thorough study of postoperative speech and more careful evaluation of the surgical technic in terms of the buccoesophageal voice. The single most important factor appears to be motivation of the patient.

FIRST INTERNATIONAL COURSE OF AUDIOLOGY

Prof. Gunnar Holmgren, *President*

Stockholm, Sweden, Sept. 11-20, 1950

One of the outstanding events in the field of audiology was the course initiated and directed by Professor Gunnar Holmgren, of Stockholm, Sweden, and given in that city in September, 1950. Approximately 110 otolaryngologists, from many European countries and the United States, attended. Nine audiologists from the United States participated in the course. For the benefit of those who wish to obtain copies of the professional presentations at that meeting, Prof. Gunnar Holmgren has decided to use Volumes 40 and 41 of the *Acta otolaryngologica* as the medium for disseminating this information. The following is a résumé of the articles in Volume 40, which will go to the regular subscribers. Anyone else interested may obtain copies of this collection of authoritative papers by writing to the editor (Address: Acta Otolaryngologica, Väpnargaten 6, Stockholm, Sweden). The following are the first 12 papers to appear, all in English.

Addressing his remarks to Her Royal Highness, Princess Sibylla, Prof. Gunnar Holmgren, of Stockholm, presented his inaugural address as an introduction to the course. The meeting was called at the suggestion of Dr. Sadowski, of Tel Aviv, Israel. Professor Holmgren mentioned the First and Second International Conferences, held in 1948 and 1949, and expressed the hope that rehabilitation of the deafened will continue along the lines already established.

Hans Engström, of Stockholm, in his article "Microscopic Anatomy of the Inner Ear." explains the embryology, and in detail, well supported by some 20 exceedingly fine plates, presents some high-power photomicrographs illustrating the minute anatomy of the organ of Corti.

Arno Saxén, Helsinki, Finland, explains his methods of investigating the secretion and absorption of endolymph in the ears of human beings and young dogs. He believes that the endolymph comes mainly by diffusion from the perilymph, as well as from the cerebrospinal fluid.

J. J. Groen, Utrecht, Netherlands, writes on the "Functional Anatomy of Hearing." Taking speech as the pattern of sound waves perceived by the ear, he analyzes the three elements, pressure (loudness), frequency (pitch), and time, showing how each is dealt with by the organ of hearing, with ultimate analysis in the higher centers.

"Audiology and the Basic Sciences" is presented by Ira Hirsh, Boston. Discussing the elements of audiology and the background of knowledge which has accumulated for many years, he elucidates the problems of the deafened person under the guidance of otologists. Audiometry, diagnosis, prognosis, and therapeutic recommendations, including psychologic evaluation, are outlined. Audiologic therapy and the scientific resources for methods to make best use of residual hearing are discussed. A final note of cooperative action indicates the value of clinical activity based on sound scientific principles.

"Pure Tone Audiometry" is discussed by Henk C. Huizing, of Groningen, Netherlands. Electronic equipment, first used in 1919 by Dean and Bunch, has now been expanded to provide several types of pure tone audiometric technique. Not only threshold values by subjective response but also the psychogalvanic method of Bordley and Hardy and the reflex methods of Dix and Hallpike are mentioned. Special techniques, using tape recorders and the classification of audiograms, form a part of Huizing's presentation.

Raymond Carhart, of Evanston, Ill., in his usual lucid manner, makes the "Basic Principles of Speech Audiometry" clear and concise. Illustrating the values obtained when normal listeners hear calibrated speech patterns, he shows clearly the variations in speech interpretation based on the discrimination curves of Davis. The proper use of speech elements in the language being used and the results of speech audiometry used in conjunction with pure-tone testing can increase our ability to be of practical help to the handicapped patient.

John E. Bordley and William G. Hardy, of Baltimore, present their experience in the article "The Etiology of Deafness in Young Children," in which are the findings from the study of 296 children. Of these, 104 cases of deafness are noted as "cause undetermined." The other 192 are divided among 23 different causes, with from 1 to 27 cases in each category. In 88 the patients had been exposed to the causative factor "by the time their delivery had been completed." It is stated that 60 of these 88 "should have started life with normal hearing."

William G. Hardy, Mirriam Pauls, and John E. Bordley, of Baltimore, outline the "Modern Concepts of Rehabilitation of Young Children with Severe Hearing Impairment." In this group, they include those whose impairment "interferes materially with the psychologic, linguistic, and social development of the child." Communication is the keynote in the development of these children. In dealing with a child from this group, the whole child must be approached by means of several professional disciplines focused on the child at the earliest possible time in his life.

I. Simpson Hall, of Edinburgh, Scotland, in his article "The Prevention and Treatment of Deafness in School Children," mentions the importance of the new methods for the control of ear infection with antibiotics and early recognition of otopathies. Routine audiometry by screening methods will disclose early cases. Hearing aids are of great value in appropriate cases. Hearing analyses after mastoid operations indicate the expected hearing change when the disease is eliminated. Public and professional education can do much to decrease the incidence of hearing impairment.

"Auditory Training and the Development of Speech and Language in Children with Defective Hearing" is presented by T. J. Watson, of Manchester, England. He points out that of the children born deaf only 5% were totally deaf, and the remainder had some residual hearing. Some capacity to hear was possessed by 95%, and methods for using this ability are applicable to approximately 70% of the pupils in the schools for the deaf with which he is associated. Marked improvement in speech and language development is thereby obtained.

"Auditory Fatigue and Adaptation" by Göran DeMaré, of Karlstad, Sweden, is the final paper. After an explanation of the methods used to investigate these two interesting phenomena of the ear, DeMare concludes that they both seem to be an "early neural process." As practical points, he indicates that auditory fatigue may be an important source of error in audiometry and that some ears are much more easily fatigued than others.

Vol. XLI of the *Acta-Otolaryngologica* will contain more papers on audiology given in the same course.

Abstracts from Current Literature

Ear

RECRUITMENT AND SPEECH DISCRIMINATION LOSS. HENK C. HUIZING and J. A. REYNTJES, Laryngoscope **62**:521 (May) 1952.

There are three types of curves seen using "PB" lists in speech audiometry. One is the "C" type seen in conductive lesions wherein increase in volume gives increased capacity to understand speech. One, the "P" type, is seen in perceptive loss in which increases in volume increase the speech capacity up to a certain point only. Thereafter the curve is flat. There is also an "R" type involving recruitment. It is a kind of "P" type but with an area of sound intensity wherein speech understanding is maximum; over this it recedes. Hence, this is a hump-type curve. The relationship of these curves to auditory training is discussed. It is pointed out that in a person with an "R" type of curve sound amplification must be kept within certain limits.

HITSCHLER, Philadelphia.

THE 1952 HERBERT STANLEY BIRKETT LECTURE: "A CRITIQUE OF PRESENT DAY METHODS OF HEARING-TESTING." D. E. S. WISHART, Laryngoscope **62**:1045 (Oct.) 1952.

Wishart discusses hearing testing and audiology, particularly for children. It is a comprehensive article and gives the advantages, as well as the disadvantages, of many of the methods of hearing testing. The encroachment of the audiologist into the place of the otologist is decried. The description of peep show used to test young children is particularly interesting. It is pointed out that all perceptive lesions are not invisible and should not be so considered.

HITSCHLER, Philadelphia.

GENERAL PRACTICE, INDUSTRIAL, MILITARY AND SCHOOL AUDIOMETRY. PAUL LINDENBERG and EDMUND PRINCE FOWLER JR., New York J. Med. **52**:2897 (Dec. 1) 1952.

The data recorded here were established in the department of otolaryngology, College of Physicians and Surgeons, Columbia University. Routine "complete physical" examinations are woefully inadequate for hearing. The spoken word, no matter how well carried out, is inaccurate and uncertain. Preemployment tests for hearing are paramount from an insurance standpoint. Deafness claims "on the job" must be compared to the amount and degree of hearing found before employment. The same holds true for our defense forces, for the United States is paying large sums to veterans whose deafness was not originally service-connected. The inference is that many men with hearing defects were admitted to service without proper screening. Deafness from dihydrostreptomycin poisoning is emphasized. "There is no accurate test of hearing capacity. . . except pure tone audiometry." The testing procedure used at the Submarine School in New London, Conn., is thoroughly described but is thought to be cumbersome. At Columbia College, in the autumn of 1949, 1950, and 1951, tests by pure-tone audiometry were found to be brief, accurate, and inexpensive and required little training of examiners. The booth offered by the Ipsa Company of Baltimore and designed by Dr. William Hardy and Mr. Overton, with some suggestions from Lindenberg, and Fowler is described in detail, and its usefulness is emphasized. It should be used by general practitioners in doing "a complete physical" and by pediatricians, whose responsibility for detecting early deafness is great. The authors made tests of 30 pupils in the first three grades in a private school. "It took exactly two minutes per child to do the sweep test." While a child was being tested, two observed so that they would know what to do when their turn came. "It is concluded that individual pure tone audiometry in a sound proof booth or quiet room. . . is the most accurate, efficient and flexible hearing test" for all purposes.

I. W. VOORHEES, New York.

THE EFFECT OF ACETYL-CHOLINE ESTERASE INHIBITING SUBSTANCES ON THE MUSCLES OF THE MIDDLE EAR AND THE LATENCY OF THE COCHLEAR POTENTIALS. LENNART GISSELSSON, Acta oto-laryng. **42**:208 (June) 1952.

The purpose of this research was to test if there was an increase in the latency of the cochlear potentials after physostigmine injection or that of similar acetylcholine esterase inhibiting substances. It was further intended to determine if this was ascribable to contraction of middle ear muscles and the corresponding decrease in the rate of sound transmission.

The observations that were made were as follows: Audiograms taken before and after the physostigmine administration did not differ. On observation of the attic no ossicular movement or contraction of the tensor tympani was observed. The time necessary to change mechanical waves into electrical waves was increased after physostigmine injection. When barium chloride was used to cause the middle ear muscles to contract, it did not increase the latency of the cochlear potentials. Relaxation of these muscles with the use of decamethonium iodide did not influence the effect of the physostigmine injection on the potentials. Gisselsson therefore concludes that the retardation of the microphonic effect of the cochlea after physostigmine administration is not due to contraction of the middle ear muscles. LEWY, Chicago.

STATISTICAL STUDY OF MASTOID CELL DEVELOPMENT IN CASES OF CHRONIC OTITIS MEDIA AS OBSERVED IN X-RAY PICTURES. SHIRO HAYASHI, J. Oto-Rhino-Laryng. Soc. Japan **54**:311 (June) 1951.

In 1918, Wittmaack advanced his theory that chronic otitis media develops in children whose process of mastoid cell pneumatization is interfered with. In 1935, Barth, and, in 1939, Mittlmeir demonstrated repneumatization of these cells which disappeared incident to chronic otitis media.

Hayashi examined x-ray pictures of the temporal bone of 893 patients, 561 of whom were men and 332 women, who had chronic otitis media. On the whole, the affected ears with chronic otitis media showed poor pneumatization. His classifications were (*a*) normal or better pneumatization, 1.4%; (*b*) pneumatization slightly suppressed, 3.6%; (*c*) pneumatization moderately suppressed, 11.6%; (*d*) no pneumatization, 83.5%. He records that the process of pneumatization proceeded as long as the inflammatory process was chiefly confined to the tympanic cavity. There was no evidence of further development of cells when the inflammatory process extended to the attic, antrum, and mastoid cells. In cases of cholesteatoma the pneumatization completely ceased. In cases of unilateral chronic otitis media the pneumatization was interfered with only in the affected ear. HARA, Los Angeles.

THE INFLUENCE OF TENSOR TYMPANIC MUSCLE ON THE MECHANICAL TRANSMISSION OF SOUND VIBRATION OF THE MIDDLE EAR: EXPERIMENTAL INVESTIGATION BY THE COCHLEAR RESPONSE. J. UKIDA, J. Oto-Rhino-Laryng. Soc. Japan **55**:1 (Jan.) 1952.

1. Loading of the tensor tympanic muscle caused a reduction of the response gain. Providing the loading weight remained within a limit, the normal value of response without loading was immediately restored when the muscle was released of the load. When the load was so great as to surpass the limit, the normal response was not restored by the release. This limit, 15 to 20 gm. weight and about 20 db. voltage loss, may be considered as the physiological limit of the mechanical stretching of the muscle.

2. Increase of the load within this limit resulted in increased loss of response, which was more marked in low tones than in high tones.

3. Increase of the load above this limit also caused increased loss of response, which, however, occurred uniformly for all frequency bands.

4. Section of the muscle was immediately followed by loss of response in various frequencies, which amounted at the most to only about 10 db. HARA, Los Angeles.

BLOOD PRESSURE OF THE CENTRAL RETINAL ARTERY: ITS MEASUREMENT IN CASES OF INNER EAR DEAFNESS INCLUDING MÉNIÈRE'S SYNDROME. I. WATANABE and M. NITTA, J. Oto-Rhino-Laryng. Soc. Japan **55**:39 (July) 1952.

Watanabe and Nitta measured the blood pressure of the central retinal artery in 36 cases of inner ear diseases of the following four groups: (1) Ménière's syndrome of unknown origin, 13 cases (measurement was made in the interval of the attacks); (2) inner ear deafness of sudden onset, 6 cases; (3) chronic progressive inner ear deafness of unknown origin, 14 cases; (4) labyrinthine syphilis, 3 cases.

Bailliart's ophthalmosphygmomanometer was used in the measurement and, at the same time, also measured the arterial blood pressure of the upper arm. Then the ratios of the former to the latter in each case were calculated.

The mean ratios of normal cases were 0.75 (maximal, or systolic) and 0.57 (minimal, or diastolic). The mean ratios of Group 1, excluding two cases which were associated with arteriosclerosis, were 0.71 and 0.45; Group 2, 0.75 and 0.52, and Group 3, 0.81 and 0.58.

In comparison with the normal only Group 1 showed a statistically significant difference. As the arterial blood pressure of the upper arm in Ménière's disease patients was almost normal, this result shows that the blood pressure of the central retinal artery in patients with Ménière's disease is lower than normal.

HARA, Los Angeles.

EXPERIMENTAL STUDIES ON THE INFLUENCE OF PILOCARPINE AND ATROPINE UPON THE INNER EAR OF GUINEA PIG. Y. YOSHIDA, J. Oto-Rhino-Laryng. Soc. Japan **55**:40 (July) 1952.

Yoshida injected pilocarpine and atropine into the common carotid artery to study histologically the influence of these drugs upon the inner ear of guinea pigs. The results obtained are summarized as follows: 1. Pilocarpine caused spontaneous nystagmus to the opposite side. 2. The hair cells of the cochlea and vestibulum, including the sacculus, utriculus, and semicircular canals, were affected by the pilocarpine to become enlarged and expanded, whereas they were found diminished in size under the influence of the atropine. 3. In the pilocarpine-treated labyrinth findings simulated "hydrops labyrinthi." 4. Histological changes were more remarkable in the vestibulum than in the cochlea. This difference is perhaps due to the difference in vulnerability between the cochlea and the vestibulum against these two drugs.

HARA, Los Angeles.

TREATMENT OF TUBOTYMPANITIS WITH INSERTION OF MEDICATED SUPPOSITORIES. TORU TSUKAMOTO, KUNITARO TSUGAWA, and EIKI NEMOTO, Otolaryngology (Japan) **24**:237 (May) 1952.

Tsukamoto and his associates report favorable results in the treatment of tubotympanitis with suppositories inserted into the Eustachian tube orifices. This form of therapy was originally suggested by Professor Takahara of Okayama University. He recommended the use of specially constructed Eustachian tube catheters of various sizes.

The suppository is composed of a base of polyethylene glycol (carbowax®), whose molecular weight is 4,000. It incorporates 1% ammonium chloride, 2% strong silver protein (protargol®), 0.01% epinephrine solution, 1% ethylmorphine hydrochloride (dionin), 0.0002 gm. iodine, 0.02 gm. per gram of potassium iodide, and 1,000 units of penicillin.

After insertion of the suppository there is a freer passage of the tube. There are four illustrations. Further study is being conducted for improvement of the agent.

HARA, Los Angeles.

Pharynx

LINGUAL TONSILS. A. J. CRACOVANER, Eye, Ear, Nose & Throat Month. **31**:489 (Sept.) 1952.

Cracovaner believes that the subject of lingual tonsils has been neglected both in the literature and in teaching. If the possibility of the involvement of the lingual tonsils is kept in mind and the laryngeal mirror is used for their inspection, affections of the lingual tonsils will be more readily discovered.

Normally, a patient with small lymphoid nodules at the base of the tongue presents no symptoms. It is only when the lingual tonsil becomes inflamed or enlarged that it may produce symptoms. Pain, if present, is rather deep inside the throat at the level of the hyoid bone. The symptoms produced by slight affections of the lingual tonsils may be so mild that some patients are considered neurotic. A person may complain of an irritation, a scratching, or a tickling in the throat, especially at night, or a frequent desire to swallow or to clear the throat. There may be an irritating cough, a feeling of a lump in the throat, sometimes tightness, and sometimes even hoarseness.

Infections of the lingual tonsils may be acute or chronic and may resemble those of the faucial tonsils, except for the difference in location of the pain or the discomfort and in the greater tendency towards chronicity following acute involvement. In the chronic stage there may be a mild sore throat lasting for weeks or months. There is a feeling of a lump on swallowing and perhaps some difficulty on swallowing food. A dry hacking, irritating cough may be present which would make one suspicious of bronchitis or bronchiectasis. Other conditions that involve the lingual tonsils include abscesses, benign and malignant tumors, ulcerations, mycotic infections, Vincent's infection, tuberculosis, and syphilitic ulcers.

Conservative treatment of the lingual tonsils may be effective in some patients. Swabbing with 10% silver nitrate, tincture of ferric chloride, or iodine in glycerin may help to reduce the infection and alleviate the symptoms. Abstinence from tobacco and alcohol is indicated. In acute conditions antibiotics are certainly helpful. Sinusitis, with its accompanying postnasal drip, may transfer its infection to the lingual lymphoid tissue, and this must be treated before one can hope to reduce the infection in the tissue at the base of the tongue. The importance of the care of coexisting sinusitis cannot be overemphasized.

In the treatment of recurrent attacks of lingual tonsillitis or in chronic lingual tonsillitis with moderate enlargement of the lymphoid tissue the cautery may be used. This is done with the use of local anesthesia with the electrocautery or the diathermy current.

If the lingual tonsils are exceptionally large, they are best removed by surgical dissection. Bleeding is readily controlled by pressure, sometimes by using astringents. There has been a false fear concerning postoperative bleeding. A little patience at the time of operation and the exertion of pressure on the area operated on are usually adequate to control the bleeding. Prominent bleeding points may be ligated.

JENNES, Waterbury, Conn.

COMPLICATIONS OF TONSILLITIS. LUIS M. NIN RECAYTE, An. oto-rino-laring. Uruguay **52**:1, 1952.

The author discusses the association of tonsillitis with systemic disturbances, such as nephritis (as a complication of both acute and chronic tonsillitis), rheumatic disturbances, and digestive disturbances. He presents illustrative cases in which apparently there was a direct relationship between the infection in the tonsils and general infections. He advocates early removal of tonsils in the course of any of these general infections.

PERSKY, Philadelphia.

FIBROMAS AND ANGIOMAS OF RHINOPHARYNX. ALFREDO ALCAINO, Rev. otorrinolaring. **12**:42 (Sept.) 1952.

Alcaino discusses tumors in the rhinopharynx and believes that most of these actually belong to the nose, since they are frequently pedunculated. It is only owing to their growth that they hang down into the nasopharynx. In view of the many difficulties encountered for the proper removal of these tumors *in toto*, Alcaino has developed a personal technique. He incises the mucous membrane of the septum from the anterior edge of quadrangular cartilage downward to the middle of the floor of the vestibule; the mucous membrane, perichondrium, and periosteum are elevated. He then fractures the quadrangular cartilage and the perpendicular plate of the ethmoid laterally to the normal side. He also infracts both the middle and the inferior turbinates on both sides of the nose. This procedure will increase the operating space considerably. The tumor can then be viewed in its entirety, its removal is facilitated, and hemorrhage is more easily controlled. After the operation the turbinates are refracted back to their normal position, and the septum is repositioned. He presents six patients who were successfully operated upon by this technique.

PERSKY, Philadelphia.

Larynx

TREATMENT OF CARCINOMA OF THE EXTRINSIC LARYNX AND LARYNGOPHARYNX. JOHN F. DALY, New York J. Med. **52**:2891 (Dec. 1) 1952.

About 1945, states Daly, interest began to be centered more on the extrinsic malignant tumors of the larynx, instead of on the intrinsic group in which cures seemed more likely. The hope that radiation would clear up the extrinsic type has not been sustained, and surgery must still be resorted to. Better anesthesia, the antibiotics, better preoperative and postoperative care, and new surgical techniques have helped to standardize and to make surgery more certain in results. Extrinsic cancer occurs in that portion of the larynx above the free border of the ventricular bands and includes the vestibule, epiglottis, aryepiglottic folds, arytenoids, and postcricoid regions. The free border of the fold is the dividing line between the extrinsic larynx and the laryngopharynx.

Poor prognosis depends upon (1) late diagnosis and (2) greater incidence of cervical metastasis. Cervical lymph node enlargement is paramount in diagnosis, treatment, and prognosis. Problems in diagnosis concern the primary lesion which may be partially visualized by x-ray and by biopsy. Trained fingers may give much information, comparing the two sides of the neck. Aspiration biopsy through properly selected needles is helpful. Frozen sections made while the surgeon waits at the operating table may be misleading.

In all extrinsic cancers of the neck metastasis occurs in from 50 to 71% of the cases. When nodes were not found upon clinical examination, metastasis was high (human failure). With the neck open for laryngectomy the surgeon has a free field for complete node resection without "cutting across the lymphatics." When large nodes were present in the neck, prognosis became poorer. The present procedure in operating is described. Postoperative care calls for penicillin administration, intravenous fluid tube feeding, and prevention of infection, hemorrhage, and pneumothorax.

I. W. VOORHEES, New York.

EPIGLOTTIC NEUROSIS. TEIICHI KASHIWADA, TOSHIO TAKEYAMA, and KYOICHI YONEDA, Otolaryngology (Japan) **24**:329 (Aug.) 1952.

Kashiwada and his associates report that a diagnosis of epiglottic neurosis was made in a series of 116 patients who complained of pharyngeal disorders. In this group there were 46 men and 70 women, the ages ranging from 20 to 60 years. In about 30% of the patients there was an acute curvature of the epiglottis, which irritated the base of the tongue. Eight per cent showed hypertrophic lingual tonsils. Of those showing anatomical abnormalities of the epiglottis, 16 had a partial epiglottectomy, and 13 of these were relieved of symptoms of irritation. Preoperative x-ray examination of these 16 patients showed a calcification of laryngeal cartilages. Histological examination indicated ossification and chronic fixation of epiglottic cartilage. The authors state that patients whose pharyngeal irritation is relieved by an application of cocaine at the base of the tongue and who show anatomical abnormality of the epiglottis should undergo an epiglottectomy.

HARA, Los Angeles.

CLINICAL STUDY OF CHRONIC ESOPHAGITIS. OKIO MUKUNO, Otolaryngology (Japan) **24**:332 (Aug.) 1952.

Mukuno makes a statistical review of 129 cases of esophageal disorders that were observed in the ear, nose, and throat clinic of Kyushu University during the fiscal year 1951. Among them there were carcinoma, 67 cases, chronic esophagitis, 16, esophageal neurosis, 14, esophageal stricture, 6, and spasm, 6. In 112 of these 129 cases esophagoscopic investigation was done. Mukuno writes of the unreliability of solely depending upon subjective symptoms in establishing diagnosis. A single x-ray investigation is at times misleading. An initial esophagoscopic examination may fail to disclose malignant lesions, and the condition may be mistaken for chronic esophagitis or esophageal neurosis. He emphasizes a need of close follow-up and study on the progress of the disease in the presence of leukoplakia, ulcerative esophagitis, and edema in order to detect cancerous changes in their very beginning.

HARA, Los Angeles.

Nose

PRACTICAL CONSIDERATIONS IN THE RELATIONSHIP OF SEPTAL PROCEDURES TO RHINOPLASTY. E. R. V. ANDERSON, Laryngoscope **62**:792 (Aug.) 1952.

Many times operative procedures in the external nasal pyramid are combined with surgery of a deviated nasal septum. The relationship between these two procedures is discussed, as well as the type and duration of anesthesia and when the two are better done at different times or together. The autogenous cartilage obtained from the triangular cartilage of the septum makes by far the best transplant.

HITSCHLER, Philadelphia.

NASAL AND PARANASAL SURGERY—A RECONSIDERATION OF FORMER METHODS. GEORGE L. WHELAN, Laryngoscope **62**:846 (Aug.) 1952.

Submucous resection is now rarely performed but still has value in some cases in which there is real obstruction to breathing. Correction is necessary, even if this be in an allergic person (it is assumed that the allergy itself has been properly managed). The operation is also justifiable if the septum blocks access to parts of the nose or the sinuses, requiring treatment, or if pressure of septal ridges causes headache.

Antral windows and the Caldwell-Luc operation still give good results after conservative therapy has failed.

Frontal sinuses still have to be surgically drained occasionally. This draining has to be done in the case of acute fulminating conditions or conditions endangering the eye or a patient's life. Removal of the anterior third of the middle turbinate often helps in chronic frontal, as well as in other, types of sinusitis.

Meningitis or blindness may result from sphenoid disease. Surgery must be kept in mind.

Other conditions requiring operative procedures are discussed.

HITSCHLER, Philadelphia.

THE OLFACTORY SENSATION IN DREAMS WITH SPECIAL REFERENCE TO DREAMS OF PATIENTS WITH CHRONIC SINUSITIS. M. ICHIHARA, J. Oto-Rhino-Laryng. Soc. Japan **55**:39 (Jan.) 1952.

No detailed report on the olfactory sensation in dream is found. Acting under the impression that such symptoms as headache, reduced attention, and poor memory in patients with chronic nasal sinusitis may have some connection with dreams in their sleep, Ichihara collected statistics for the following 600 subjects: (1) samples of outpatients in general of his clinic, 100 men and 100 women; (2) samples of patients with chronic sinusitis, 100 men and 100 women; (3) control samples consisting of students and nurses, 100 men and 100 women.

The following incidences were recorded among 453 dreamers:

Classification	Incidence	Percentage
Visual	196	43.3
Auditory	108	23.8
Taste	39	8.6
Pain	33	7.3
Smell	13	2.9

Six men and seven women experienced smell in dream, the quality of which was generally related to meals. Of these 13, seven subjects possess unusually delicate discrimination in odors in their everyday life. For 10 subjects the experience of smell in dreams had left so strong an impression that they could accurately state the date of the experience.

Patients with chronic sinusitis dreamed more frequently than the controls. Many unpleasant dreams were reported, frequently associated with unpleasant feeling or headache on waking. Such a trend was more pronounced among women patients.

HARA, Los Angeles.

A CASE OF RETICULOSARCOMA ORIGINATING IN THE ETHMOIDAL CAVITY. S. KISHI and K. SUWA, J. Oto-Rhino-Laring. Soc. Japan **55**:41 (July) 1952.

A patient, a 64-year-old peasant's wife afflicted with stenosis in the left nose, occasional epistaxis, and epiphora from the left eye, had a tumor in the left nasal cavity. The tumor was

surgically removed by Denker's method, and the patient was irradiated with x-rays after the operation. The histological investigation of the tumor and the mucous membrane of the ethmoidal cavity showed the growth to be fibrosarcoma.

After two months there again arose a swelling in the sinus ethmoids associated with left exophthalmos. As the result of x-ray irradiation and nitrogen mustard injection, the swelling grew smaller, and the left exophthalmos receded, but the patient died with pulmonary complications.

Autopsy revealed metastases in the lungs, the heart, and the skin; and, in addition, a "tumor-block," as described by Oliveira, was found in the heart. Thus, the metastasis in this case occurred hematogenously, and death was the result of respiratory disturbance due to the lung metastasis.

HARA, Los Angeles.

Miscellaneous

EXPERIMENTAL APPLICATIONS OF ULTRASONICS TO THE LOCALIZATION OF BRAIN TUMORS: PRELIMINARY REPORT. L. A. FRENCH, J. J. WILD, and D. B. NEAL, J. Neurosurg. **8**:198 (March) 1951.

This report concerns an experimental attempt to apply ultrasonic pulses to the localization of brain tumors. The purpose of these experiments was to examine the possibility of locating, at the time of operation, subcortical neoplasms without the use of brain needles. The experiments were based on the principle that high-frequency sound waves, when driven through tissues, are believed to travel at a rate proportional to the tissue density and to the tissue elasticity. These sound waves are reflected by surfaces involving change in density or elasticity, known as interfaces, and echoes are produced. The time interval before reception of the echo varies according to the texture and thickness of the tissue which the waves traverse. With these known data, it was postulated that when ultrasonic pulses were sent through normal brain tissue, the presence of an underlying subcortical neoplasm might be ascertained by measuring this time interval.

It was found that when pulsed ultrasonic vibrations were sent through normal and neoplastic cerebral tissues, the texture of the neoplastic cerebral tissue was such that the ultrasonic response was approximately twice that of normal cerebral tissue. Subcortical cerebral neoplasms were located in autopsy material by this method of investigation.

Pulsed ultrasonic vibrations of this frequency did not produce demonstrable damage in the cerebral hemispheres of experimental animals.

ALPERS, Philadelphia [A. M. A. ARCH. NEUROL. & PSYCHIAT.].

CHORDOMA: EXPERIENCE WITH THIRTEEN CASES. J. L. POPPEN and A. B. KING, J. Neurosurg. **9**:139 (March) 1952.

Chordomas producing clinical symptoms are rare. Poppen and King report 13 cases, the lesion being intracranial in 7 and arising in the spine in 6.

Neither the clinical history nor the examination revealed anything that was thought to be characteristic of a chordoma. The x-ray examination was most helpful in revealing the position and extent of the lesion but was of little help in determining the cause. The bony involvement, of which destruction was the most important element, nearly always suggested metastatic carcinoma. In several instances, sclerosis and new-bone formation were noted.

Wherever chordomas are situated, they look more or less alike. They appear as lobulated gelatinous masses, often with a thin capsule. When incised, the tissue is soft, yellowish or raspberry color, and jelly-like and can sometimes be aspirated with a large suction tube. Occasionally a chordoma may be a firm red cartilaginous mass.

Penetration of the dura may lead to the correct diagnosis. This is an uncommon occurrence with any type of tumor except the chordoma. Few chordomas metastasize. They show great histologic variations, considerable variation being found even within a single tumor.

Although it has repeatedly been stated that most patients do not live much longer than eight months after they are first seen, and this was generally true in the present series, symptoms are often present for years before the patient seeks treatment. Some patients have been known

to live a decade, and two of the patients in this series were still alive at the time of the report, more than six years after the tumor was verified.

The authors are in agreement with the statement that the tumor can rarely be completely removed surgically. This was possible in only one of their intracranial cases and in none of the spinal cases. Although surgical treatment leaves much to be desired, an occasional patient may be benefited greatly by it, so that surgical intervention should not be withheld.

Despite the fact that chordoma is an embryonal tumor, it is highly resistant to x-rays. These workers believe that x-ray therapy should be used but that the doses must be very large to be of value.

ALPERS, Philadelphia [A. M. A. ARCH. NEUROL. & PSYCHIAT.].

SPONTANEOUS RUPTURE OF THE ESOPHAGUS. S. A. MACKLER, Surg., Gynec. & Obst. **95**:345 (Sept.) 1952.

Mackler's summary of this article is quoted in full as follows:

1. Spontaneous rupture of the esophagus is an accident which may follow a sudden rise in intra-abdominal pressure, usually vomiting. Other acts which have resulted in rupture are: straining at defecation, lifting a heavy weight, a convulsive seizure of grand mal epilepsy, and the labor of childbirth.

2. Distinction is made between rupture and perforation of the esophagus.

3. The triad of vomiting, low thoracic pain, and emphysema of the neck is diagnostic and constitutes sufficient evidence to warrant a left thoracotomy.

4. Evidence is presented to support the conclusion that rupture occurs in a previously normal, healthy esophagus as a result of intraesophageal pressure, transmitted from the stomach. The rupture uniformly occurs at the lower extremity of the esophagus upon the left lateral wall, apparently the weakest part of the organ. That this is indeed the weakest part of the esophagus was confirmed by experimentally inflating and bursting the esophagi of 65 fresh human cadavers. The site and configuration of the resulting rupture duplicated exactly the clinical lesion.

5. Three cases of spontaneous rupture of the esophagus are presented. The treatment was surgical: left thoracotomy, suture of the esophagus, and drainage. The recovery of 2 of the patients brings to a total of 13 those surviving a spontaneous rupture of the esophagus. The outcome was uniformly fatal before the adoption of a surgical method of treatment.

FRIEDBERG, Chicago.

FRONTAL LOBE ABSCESS SECONDARY TO ORBITAL INFECTION AND FACIAL ERYSIPELAS. L. CAMISASCA and L. SALVADORI, Riv. oto-neuro-oftal. **25**:192 (May-June) 1950.

A man aged 26 noted redness of the right cheek, with fever and erysipelas. A few days later exophthalmos and poor vision of the right eye developed. The right frontal sinus was explored, but no pus was found. A few days later fever appeared, with confusion, slow pulse, and headache. Reexploration of the right sinus again failed to reveal pus. Lumbar puncture showed 350 cells per cubic millimeter, with 60% lymphocytes and 30 mg. of glucose per 100 cc. The left frontal sinus was found to be cloudy and was explored, but no pus was found. Penicillin therapy gave transitory improvement. A few days after the last exploration his condition became worse; the pulse rate fell to 60, and nuchal stiffness developed. The right frontal lobe was punctured, and pus was removed. A week after this puncture bilateral papilledema developed, with central scotomas, despite clinical improvement. The choking persisted 15 days and then regressed, with no significant diminution of vision. Spread of infection from the face directly to the brain without involvement of the cavernous sinus is rare. The papilledema appearing a week after the incision of the frontal lobe abscess is considered by the authors a toxic reaction, rather than a manifestation of increasing intracranial pressure.

SAVITSKY, New York [A. M. A. ARCH. NEUROL. & PSYCHIAT.].

Books

Die Chirurgie der Speicheldrüsen. By Prof. Dr. Eric König. Cloth. Price, 12 German marks. Pp. 123, with 44 illustrations. Walter de Gruyter & Co., Genthinerstrasse 13, Berlin W 35, 1951.

This monograph is an excellent presentation describing the salivary glands. It crystallizes the known pathologic conditions. The illustrations are very critical and elucidative. The indications for surgery are clearly presented; nevertheless, surgical procedures are described very sketchily. More emphasis could be placed on the technique of various surgical operations. There is an extensive bibliography which covers every phase and discussion in this monograph. All in all, this is a worth-while presentation which will give a quick reference for a series of conditions that crop up rather frequently in every otolaryngologist's practice.

Geschwülste des Ohres und des Kleinhirnbrückenwinkels. By K. Graf, Zurich, Switzerland. Price, 43 German marks. Pp. 283, with 132 illustrations. Georg Thieme Verlag, (14a) Stuttgart O, Diemershaldenstrasse 47, Germany, 1952; agents for U. S. A., Grune & Stratton, Inc., New York.

This book describes in detail the neoplasms relating to the ear, mastoid, cerebellopontine angle, and their adjacent areas. Descriptions of neoplasms of the external auditory canal, the concha, and carcinomas of the middle ear are not included.

The author directs his principle effort to lesions of the cerebellopontine angle and the porus acusticus internus. The literature is reviewed, and the history, symptomatology, pathological anatomy, and surgical therapy of 40 of the author's cases are given, as observed in the University Clinics of Zurich. Clinical symptoms elicited by involvement of the cochlear and the vestibular nerves are described very thoroughly. X-ray studies with typical pictures cover a large chapter of the book. The Stenvers exposure is preferred. To the histology of the tumors is devoted the author's greatest interest. He believes that the neurosurgical suboccipital (Cushing) approach is not sufficient to remove completely the tumors which have grown into or have originated from the depth of the internal acoustic meatus (medial acoustic tumors, Brunner). Here in a second stage the translabyrinthine (Panse) or the modern paralabyrinthine (Seifert) operation is indicated.

Other chapters deal with the neurinomas of the trigeminal, facial, and glossopharyngeal nerves. Meningiomas are divided into two groups: (*a*) those originating extratemporally and growing along the base of the skull into the ear and (*b*) the primary meningiomas of the petrous pyramid near the pontocerebellar angle. The author's observations are reported.

The frequent occurrence of angiomas of the ear is stressed. Among these the recent interest in the glomus tumors of the tympanum is enhanced with a description of personal observations.

Descriptions of carcinomas originating from the epipharynx and perforating into the base of the skull are included in this treatise. Cases of sarcomas and mestastatic tumors of the ear and temporal bone are added.

The last chapter deals with primary cholesteatoma and arachnoiditis circumscripta. The differential diagnostic problems of these conditions are demonstrated, and their importance is stressed.

Diseases of the Ear, Nose, and Throat: Principles and Practice of Otorhinolaryngology; Clinical Technics and Procedures. By Francis L. Lederer, M.D., F.A.C.S., Professor and Head of Department of Laryngology, Rhinology, and Otology, University of Illinois College of Medicine, Chicago, and seven contributors. Sixth edition. Price, $20.00. Pp. 1490, with 20 full-page color plates and 979 illustrations. F. A. Davis Company, 1914-16 Cherry Street, Philadelphia 3, 1952.

The author has made the most of his opportunity to expand this new edition of his textbook, which has become a standard in many institutions. He has included new chapters and has

enlarged many others. He has had the able assistance of authoritative associates and contributors. This book is voluminous, massive, and encyclopedic.

This single volume attempts to contain all information on subjects related to otolaryngology. It might be questioned whether such an enterprise can do adequate justice to the various aspects of the field. At least an attempt has been made to correlate those chapers, such as allergy, general pathology, ophthalmology, psychiatry, x-ray, and speech and voice, which may well be subject matters for a textbook in their own right.

The chapter headings are included under five large sections which attempt to cover the entire field as follows: the ear; the nose and paranasal sinuses; the mouth and pharynx; the larynx, trachea, bronchi, and esophagus; general and correlated considerations. It is well written. The printing is good, and the arrangement of double-column pages makes for easy reading. The color plates are good, and, as a whole, the illustrations and photographs are clear, though some of the photomicrographs leave much to be desired in their black and white reproductions. The author is to be commended for his efforts in producing such a book. There is no doubt that it will be well received by the student and by general practitioner and specialist alike. It should find a place in every hospital and medical school library.

Directory of Otolaryngological Societies *

INTERNATIONAL

Canadian Otolaryngological Society
(Société Canadienne d'Otolaryngologie)

President: Dr. D. E. S. Wishart, 170 St. George St., Toronto.
Secretary: Dr. W. Ross Wright, 361 Regent St., Fredericton, N. B.
Place: Minaki Lodge, Minaki, Ont. Time: June 14-18, 1953.

Fifth International Congress of Oto-Rhino-Laryngo-Broncho-Esophagology

Place: Amsterdam. Netherlands. Time: June 8-13, 1953.
President: Prof. Dr. Eelco Huizinga.
General Secretary: W. H. Struben, Viottastraat 1, Amsterdam-Z
Scientific Secretaries: Dr. J. Bijtel and Dr. P. G. Gerlings.

International Congress of Audiology

Place: Leyden, Netherlands. Time: June 5-6, 1953.
General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Holland.

International Course in Paedo-Audiology

Place: Groningen, Netherlands. Time: June 1-4, 1953.
General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Holland.

Pan American Association of Oto-Rhino-Laryngology and Broncho-Esophagology

Meeting: Fourth Pan-American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
Place: México, D. F., Mexico. Time: January, 1954.
President: Dr. Justo Alonso.
Exec. Secretary: Dr. Chevalier Jackson, 1901 Walnut St., Philadelphia 3, Pa.
President of Congress: Dr. Ricardo Tapia Acuna.

Third Latin-American Congress of Otorhinolaryngology and Bronchoesophagology

Place: Caracas, Venezuela. Time: 1953.

NATIONAL

American Medical Association, Scientific Assembly, Section on Laryngology, Otology and Rhinology

Chairman: Dr. Dean Lierle, Iowa City.
Secretary: Dr. Sam H. Sanders, 1089 Madison Ave., Memphis 3.
Place: San Francisco.

American Academy of Ophthalmology and Otolaryngology

President: Dr. James Milton Robb, 315 Lakeland Ave., Grosse Pointe 30, Mich.
Executive Secretary-Treasurer: Dr. William L. Benedict, 100-1st Ave. Bldg., Rochester, Minn.
Place: Palmer House, Chicago. Time: Oct. 11-17, 1952.

American Board of Otolaryngology

Secretary: Dr. Dean M. Lierle, University Hospitals, Iowa City.
Place: Roosevelt Hotel, New Orleans. Time: April 21-25, 1953.

* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.

American Broncho-Esophagological Association

President: Dr. Fred W. Dixon, 1027 Rose Bldg., Cleveland.
Secretary: Dr. Edwin N. Broyles, 1100 N. Charles St., Baltimore 1.
Place: Roosevelt Hotel, New Orleans. Time: April 28-29, 1953.

American Laryngological Association

President: Dr. Louis H. Clerf, 128 S. 10th St., Philadelphia 7.
Secretary: Dr. Harry P. Schenck, 326 S. 19th St., Philadelphia 3.
Place: Roosevelt Hotel, New Orleans. Time: April 26-27, 1953.

American Laryngological, Rhinological and Otological Society, Inc.

President: Dr. Francis E. LeJeune, 49 Audubon Blvd., New Orleans 18.
Secretary: Dr. C. Stewart Nash, 708 Medical Arts Bldg., Rochester 7, N. Y.
Place: Roosevelt Hotel, New Orleans. Time: April 28-30, 1953.

SECTIONS:

Eastern.—Chairman Dr. Irl H. Blaisdell, 1100 E. Genesee St., Syracuse 10, N. Y.
Place: Hotel Syracuse, Syracuse, N. Y. Time: Jan. 7, 1953.
Southern.—Chairman: Dr. W. W. Wilkerson, Jr., Curtiswood Lane, Nashville 4, Tenn.
Place: Andrew Jackson Hotel, Nashville, Tenn. Time: Jan. 12, 1953.
Middle.—Chairman: Dr. Henry L. Williams, 818 4th St., S. W., Rochester, Minn.
Place: The Drake, Chicago. Time: Jan. 19, 1953.
Western.—Chairman: Dr. Alden H. Miller, 4000 Woking Way, Los Angeles 27.
Place: The Elks Club, Los Angeles. Time: Jan. 24, 1953.

American Otological Society, Inc.

President: Dr. Albert C. Furstenberg, 201 S. Main St., Ann Arbor, Mich.
Secretary-Treasurer: Dr. John R. Lindsay, 950 E. 59th St., Chicago.
Place: Roosevelt Hotel, New Orleans. Time: May 1-2, 1953.

American Otorhinologic Society for the Advancement of Plastic and Reconstructive Surgery, Inc.

President: Dr. Benjamin H. Shuster, 1824 Pine St., Philadelphia.
Secretary: Dr. Louis Joel Feit, 50 Park Ave., New York 16.

American Society of Ophthalmologic and Otolaryngologic Allergy

President: Dr. William H. Evans, 24 Wick Ave., Youngstown 3, Ohio.
Secretary-Treasurer: Dr. Joseph Hampsey, 806 May Bldg., Pittsburgh 22.

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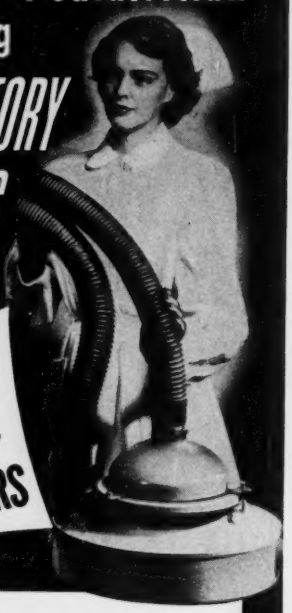

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J. Lamar Callaway, M.D.	Durham, N. C.
John M. Converse, M.D.	New York, N. Y.
Glen G. Gibson, M.D.	Philadelphia, Pa.
Jack Guyton, M.D.	Baltimore, Md.
Wallace E. Herrell, M.D.	Rochester, Minn.
Charles E. Iliff, M.D.	Baltimore, Md.
Frank D. Lathrop, M.D.	Boston, Mass.
Francis Lederer, M.D.	Chicago, Ill.
Irving H. Leopold, M.D.	Philadelphia, Pa.
Arthur Linksz, M.D.	New York, N. Y.
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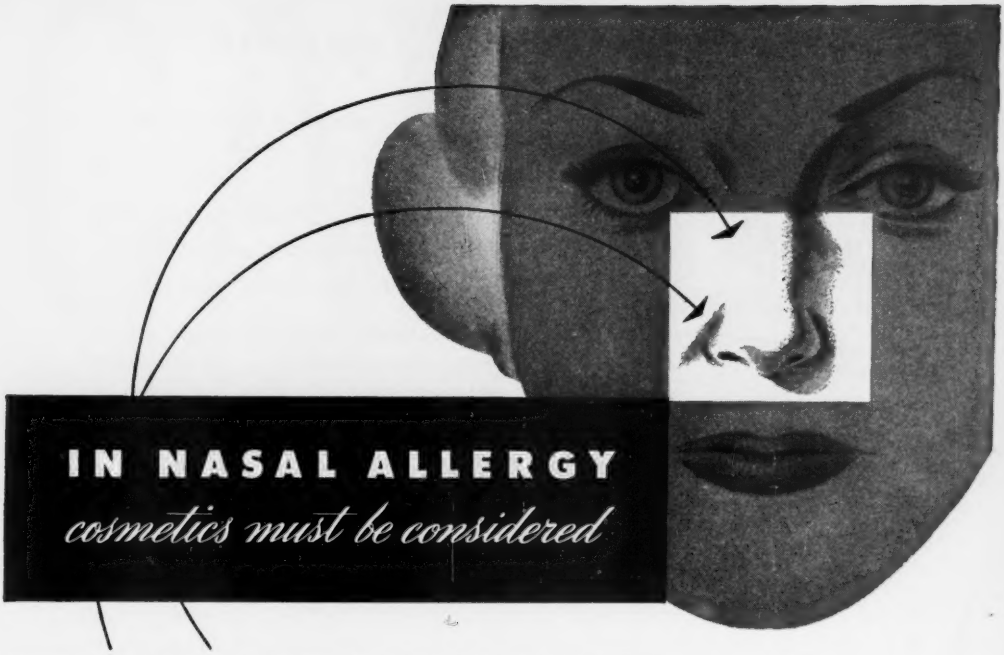

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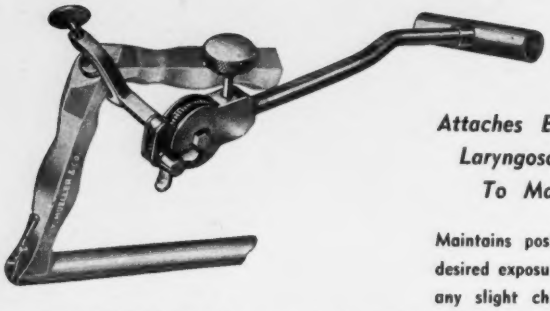

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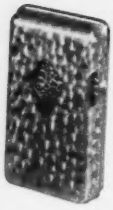

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1. Warren, William C., Jr.: *South. Med. Jour.*, 44:449, May, 1951.
2. Voorhees, Darrell G.: *Ann. Otol. Rhin. & Laryng.*, 60:36, Mar., 1951.
3. Kelley, Samuel F.: in Gold, Harry, et al.: Cornell Conferences on Therapy. New York, Macmillan Co., 1947, vol. 2, p. 186.